BREAK-IN

November/December 2012

The Official Journal of the
New Zealand Association of Radio Transmitters (Inc.)

Dedicated to

Amateur Radio and Electronics

in New Zealand since 1928

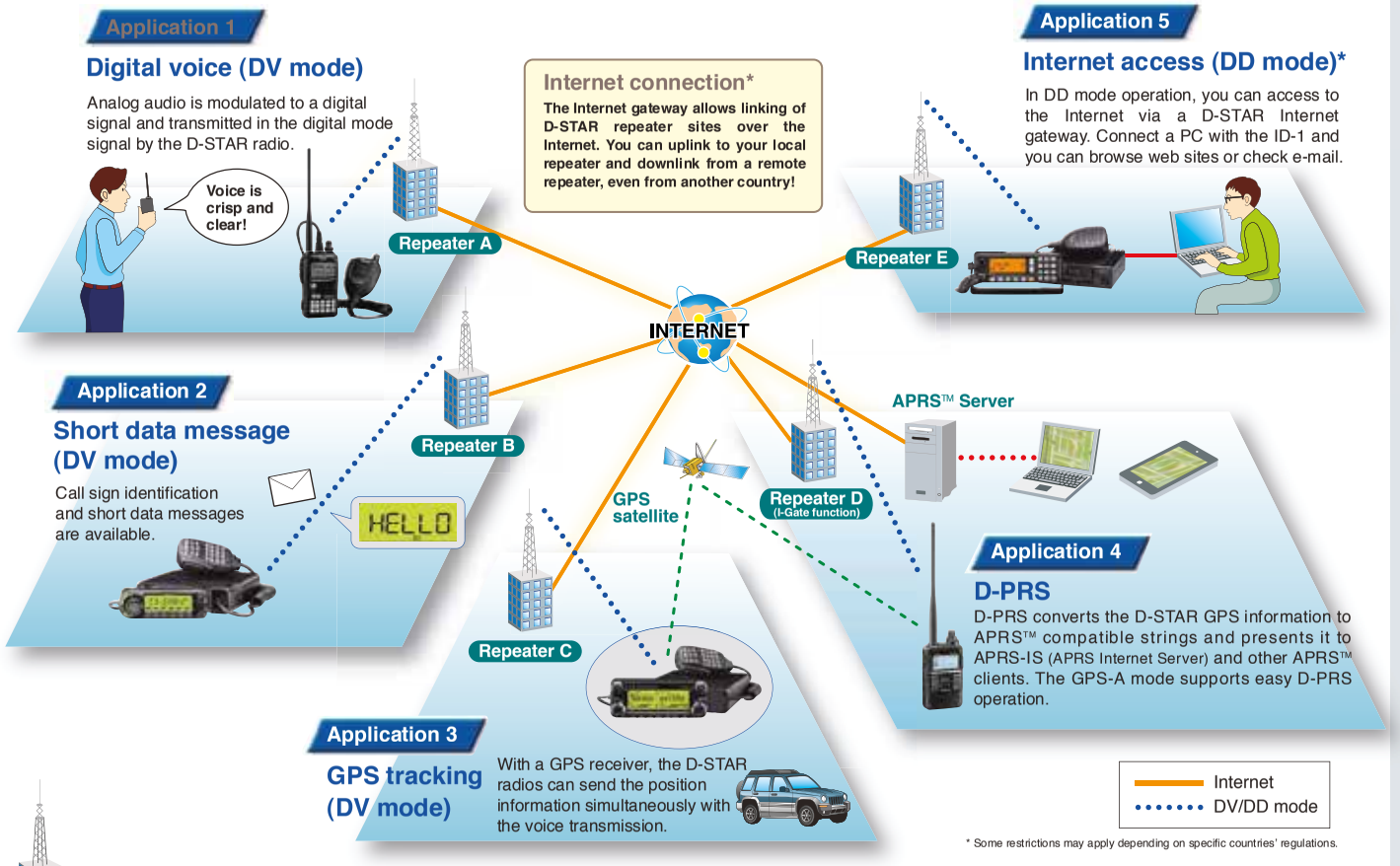
In this issue:

- Amateur Digital Television Transmissions
- Transmitting Antennas for 500 kHz; Part 1
- SWR myths and mysteries
- Two Way Mobile Tests via HVTL Lines
- Hacking the VK5SJT Antenna Analyser
- Call for nominations
- NZART President and Council
- Amateur Radio Memoirs
- Tony's Maritime Net
- ZL Crossword 19
- Annual index ***Break-In*** 2012

With the kind support of... kordia

Five Examples of Having Fun with D-STAR

Have you ever thought about if you could access the Internet from ham radios?
Or have you ever thought if you could communicate with a friend in another city or country using a simple haudheld radio?
Or want to send a simple text message, or know the call sign of whom is on the air right now?
The D-STAR (Digital Smart Technology for Amateur Radio) system is such a system where you can easily do these functions without using a tricky gadget or complicated facilities.


Application 1
Digital voice (DV mode)
Analog audio is modulated to a digital signal and transmitted in the digital mode signal by the D-STAR radio.
Voice is crisp and clear!
Repeater A
Internet connection*
The Internet gateway allows linking of D-STAR repeater sites over the Internet. You can uplink to your local repeater and downlink from a remote repeater, even from another country!
Application 5
Internet access (DD mode)*
In DD mode operation, you can access to the Internet via a D-STAR Internet gateway. Connect a PC with the ID-1 and you can browse web sites or check e-mail.
Repeater E
INTERNET
Application 2
Short data message (DV mode)
Call sign identification and short data messages are available.
HELLO
Repeater B
GPS satellite
Repeater D
(I-Gate function)
APRS™ Server
Repeater C
Application 4
D-PRS
D-PRS converts the D-STAR GPS information to APRS™ compatible strings and presents it to APRS-IS (APRS Internet Server) and other APRS™ clients. The GPS-A mode supports easy D-PRS operation.
Application 3
GPS tracking (DV mode)
With a GPS receiver, the D-STAR radios can send the position information simultaneously with the voice transmission.
Internet
DV/DD mode

* Some restrictions may apply depending on specific countries' regulations.

D-STAR repeater

ID-RP2C:
Repeater controller

One unit is required for each repeater station and connects up to 4 RF modules. Transfers the received signal to the specified RF module or the Internet gateway server.

ID-RP2D:
1.2GHz DD mode RF module

The ID-RP2D is the DD mode RF module for 1.2GHz. It provides 128kbps high speed data communication.

Photo shows ID-RP2V.

ID-RP2V: 1.2GHz DV mode RF module
ID-RP2000V: 144MHz DV mode RF module
ID-RP4000V: 430MHz DV mode RF module

These are DV (digital voice) mode RF modules for the respective bands. With a combination of these RF modules, cross band operation with 144/430/1200MHz bands is available.

RS-RP2C:
Internet gateway software

The Internet gateway (GW) connects the D-STAR repeater station to the Internet and links multiple D-STAR repeater stations via the Internet.

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Q&A Frequently Asked Questions About D-STAR

Q What does "D-STAR" stand for?

A The "D-STAR" stands for Digital Smart Technology for Amateur Radio. It is an open standard digital communication protocol established by JARL*. Please refer to http://www.jarl.com/d-star/shogen.pdf for technical details. * Japan Amateur Radio League

Q What can I do with the D-STAR radio?

A 4.8kbps digital voice (DV) mode and 128kbps data* (DD) mode communications are available. When using DD mode with a PC and the D-STAR radio, high speed data communication is possible. * DD mode is available with ID-1 only.

Q Can I send data with a voice transmission? DV mode only

A Yes, you can. In DV mode operation, you can simultaneously send up to 950bps of data, such as call sign, short data message or GPS position with a voice transmission.

Q Can I use the D-STAR repeater without connecting to the Internet?

A Yes, you can use a D-STAR repeater as a local repeater. Simplex mode communication in DV or DD mode is also available without requiring a D-STAR repeater.

Q Can I make a call with other countries?

A Yes, you can*. The Internet gateway allows you to relay your call to a remote D-STAR repeater over the Internet. The D-STAR repeater call sign and IP address must be registered to the gateway server. * Some restrictions may apply depending on specific countries' regulations.

Q Can I receive a call only when the call is intended for me?

A Yes, you can. The call sign squelch function opens the squelch only when your call sign is received.

Q How do I set call signs to make a call in DV mode?

A The latest ID-31E has the DR (D-STAR Repeater) mode operation and makes it easier to transmit a call using a D-STAR repeater.

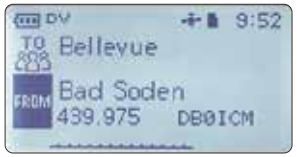
When using the ID-31E, you need just three steps.

Step 1. MY call sign
Register your own call sign.

Step 2. FROM field
Select your access repeater to the FROM field.

Step 3. TO field
Select the destination repeater or the destination call sign to the TO field.

Then push the PTT button to transmit.



Setting example for from Bad soden, Germany to Bellevue, WA, U.S.A.

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*The term **break-in** refers to a system in CW whereby the transmitting station can hear the other station's signal during "key up" periods.*

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Contents

Technical

4 Amateur Digital Television Transmissions
Vaughan Henderson ZL1TGC

6 Transmitting Antennas for 500 kHz; Part 1
David Conn VE2KL

9 SWR myths and mysteries
Andrew Barron ZL3DW

12 Two Way Mobile Tests via High Voltage Transmission Lines
Steve Fogerty ZL2ASF

14 Hacking the VK5SJT antenna analyser
Robin McNeill ZL4IG

General

13 Call for nominations; NZART President and Council
Evan Sayer

16 Amateur Radio Memoirs
Cliff Reed K6DO, ex ZL2AHV, ZL1AR, ZL1BR

18 Tony's Maritime Net
Patricia M Dallas ZL2RK

22 ZL Crossword 19 (answers p37)
Graeme Hunt ZL1ANH

43 Annual Index *Break-In* 2012

Cover Photograph; Two way mobile tests via HVTL lines; ZL2BK near Renwick (photo ZL2BK)

Regular Features

32 AREC
25 Around the Branches
19 Awards
11 *BI* 50 Years Ago
35 Contests
23 Digital Modes
38 DX Downunder
5 From the *Break-In* archives
2 From the Editor
3 From the President
44 Hamads
22 IARU
42 Ionospheric Predictions
26 Longer Wavelengths
29 Magazine Survey
34 Monitoring Service
20 Morseman
15 New Members
36 Old Timers Club
39 QSL Bureau
28 Satellite Orbits
5 Silent Keys
30 VHF Scene
40 WARO

PAST ISSUES OF *BREAK-IN*
Indexes for past volumes of *Break-In* from 1949 to the present are available on the NZART website: <http://www.nzart.org.nz/breakin/index/index.html>

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From The Editor

John Walker ZL3IB
<editor@nzart.org.nz>

I am pleased to say that from a non-seismic point of view the past year has been relatively uneventful but nevertheless many hams living in the greater Christchurch area are still suffering disruptions to their lives whilst they await repairs etc to their homes and, in the case of Christchurch branch 05, their clubroom problems. We all look forward to the city's eventual return to normality.

From an editorial point of view the year has seen a reasonable supply of copy with a good range of coverage and variety of topics. Nevertheless there is no room for complacency and we still need more and varied contributions for publication. For example I should like to see more short biographical articles featuring local ham's shacks and interests and more simple constructional articles.

This year has also seen some major changes with a new printer and typesetter. For a number of reasons we had to relinquish our long association with Wyatt & Wilson. However ROE Print Services now organise our printing and we are fortunate to enjoy the skilled typesetting services of Mrs Angela Christmas.

Members should now have received the 2012-2013 edition of *Call Book* and I should like to thank *Call Book* editor Lorne Douglas ZL2AHB for his excellent work. This should culminate in the enclosed CD version which also includes the Australian call-sign lists and pdf versions of the past two year's issues of *Break-In*.

Finally I must I must say a big "thank you" to our loyal band of regular columnists and contributors; without their efforts *Break-In* would be a very skinny magazine. My sincere thanks also go to our typesetter Angela Christmas and Grant Chellew of ROE Print Services for their excellent work on our behalf producing a high-quality magazine.

In conclusion I and the *Break-In* team offer all our readers and their families our sincere good wishes for the coming festive season and the New Year.

John Walker ZL3IB, Editor

Next deadline for copy is
10 January 2013

New Zealand Association of Radio Transmitters INC

(Founder Member of the International Amateur Radio Union Region 3)

Mail to: BUSINESS MANAGER, PO BOX 40-525, UPPER HUTT 5140, NEW ZEALAND

PLEASE ENROL ME AS A NEW MEMBER AS FOLLOWS:

TRANSMITTING ☐ NON-TRANSMITTING ☐ STUDENT ☐ FAMILY ☐ OVERSEAS ☐ ASSOCIATE ☐ CONCESSIONARY ☐

MR / MS / MRS / MISS	INITIALS	SURNAME
ADDRESS		
OCCUPATION		DATE OF BIRTH

CALL-SIGN	
PREFERRED BRANCH, NAME or NO	
PLEASE FIND ENCLOSED	**$**
MY SUBSCRIPTION TO	**Dec 31 2013**
I agree to abide by the NZART Constitution	Signature:

The information requested (other than date of birth) is for membership records required to be maintained under the Incorporated Societies' Act 1908. Date of Birth is requested for statistical purposes only.

Membership benefits include the automatic inclusion of transmitting call-sign holders' address details in Call Book (published annually).

If you DO NOT wish your details published please sign below:

I DO NOT want my address details published by NZART _____

IF YOU PREFER TO PAY BY CREDIT CARD PLEASE COMPLETE

EXPIRY DATE

VISA ☐ MASTER CARD ☐

CARD No.

Signature:

From The President

Vaughan Henderson ZL1TGC
<vaughan@bidecphone.co.nz>

My apologies for the non-appearance of my column in the last *Break-In*. I was working overseas and although I had written and emailed the material, when I got back home I received several time-out email messages saying that the emails had not been delivered. The one to Editor John ZL3IB was amongst them and by then it was too late, the deadline for *Break-In* had long gone.

As you will have seen from Infoline, a new member promotion mail-out to over 3000 radio amateurs who are not members of our Association took place at the end of October. Debby ZL2DL, Steve her husband and family members were all 'volunteered' for the occasion. Printing, folding and filling 3078 envelopes takes a little time. My thanks to Debby and her team for tackling that task so successfully.

The special offer of $49 is for one year's membership and will also include a CD Rom *Call Book*. Those that take advantage of this special offer will be entered into a draw to win a 2 metre hand held radio. Only those amateurs within New Zealand who have not belonged to the Association for 3 or more years, or have never been a member will be eligible to join with this offer.

As I write this, as of 9 November we had 77 new members, 44 of whom were previous members who had let their membership lapse and 33 are new members. May I take this opportunity to welcome those new and returning members and I hope you will enjoy the benefits of belonging to NZART, your national amateur radio association.

While this offer may look like we are not considering our current members who have loyally supported the Association, please be assured that this is not the case. Please remember that without you, NZART would cease to exist! If we can attract enough new members to NZART, this will reduce our operating costs, so your subscriptions will not increase and we will be in a much better position to focus on getting new people into our hobby of amateur radio.

Those of you who have not paid your subscription for the 2013 year will by now have received a reminder notice. Debby ZL2DL has asked me to remind you that if paying the full amount in one lump sum is not possible, she is very happy to receive your subscription in monthly instalments which work out to only $9.00 per month. If this approach would help, please get in touch with Debby at headquarters.

While on the subject of our headquarters in Upper Hutt, I'm pleased to report that a new four-year lease has been signed with the landlord giving us some security of tenure. The lease provides for a rent review after two years, and thanks to some good negotiating by the Council Working Group of Warren ZL2AJ and Stuart ZL2TW, this increase will be limited to not more than the consumer price index. We are still on the look-out for some additional space to house our archive material. If you know of, or can offer some storage space that is dry, and preferably in the Upper Hutt area, although that may not be essential, please let Debby know at headquarters.

As the 2012 year draws to a close, so does the deadlines for a number of matters that I need to draw your attention to. Elections for the Position of President and Council of your association will be held early next year with nominations closing on the 31 December. I think it would be great if we could have an election for all the Council positions in all the electoral districts. Please give this some thought and consider offering your services if you are asked by your fellow amateurs. If you are not sure what is involved, please email me <zl1tgc@nzart.org.nz> and I'll be happy to send you some information. If you would like a nomination form, please contact Debby at headquarters by email at <nzart@nzart.org.nz> or phone 04 939 2189.

In addition to nominations for the association's executive, please also give consideration to any remits for Conference 2013. Remits MUST be into headquarters by 31 December 2012. Late remits will not be considered.

We would also like to receive nominations for Amateur of the Year, Young Amateur of the Year; is there someone in your club who has done an outstanding job, be they old or young? Deadline for these nominations is also 31 December 2012. It is also time to start thinking about nominations for the Jumbo "ZL1HV" Award. Applications for this award close on 1 May 2013 at HQ.

It's also not too soon to start planning to attend next year's AGM and Conference at the Copthorne Hotel and Resort, probably better known to many of you as the Solway Park on High Street, Solway, Masterton. Queen's Birthday weekend 2013 is over the weekend of June 1, 2 and 3. Wairarapa Branch 46 who are hosting the event now have a web site up and running and the registration form is available from the web site at <www.nzartconference2013.co.nz>. A special rate is available for accommodation at the Copthorne. See elsewhere in this issue of *Break-In* for more details.

The other major amateur radio event for 2013 is the bi-annual Technology Convention which is being held in Auckland over Easter weekend, the thirtieth and thirty-first of March. The venue is the Western Springs Garden Community Hall and is being hosted by Branch 66, the Auckland VHF Group. More details will be in the next issue of *Break-In*.

From the brief reports to hand it appears that the 15th IARU Region 3 Conference in Ho Chi Minh City which concluded on Thursday 8 November was a success. A record number of 16 regional societies were represented by over 80 delegates and observers. Also attending were IARU President Tim Ellam VE6SH, and representatives from Regions 1 & 2, as well as IARU Secretary Rod Stafford W6ROD. Our team at the Conference was John Lochhead ZL4QS as Delegate, with Don Wallace ZL2TLL (Administration Liaison Officer) and Terry Carrell ZL3QL as observers. Terry ZL3QL was asked to chair the Conference, a signal honour recognising not only NZART's contribution to IARU Region 3, but also Terry's skills and abilities having successfully chaired the 14th Region 3 Conference in Christchurch and also the 5th Conference held in Auckland in 1985. A summary report on the 15th Region 3 Conference appears elsewhere in this issue of *Break-In*. My thanks to the team who so ably represented us at this Conference.

On behalf of you all, I'd like to extend our congratulations to the Marborough Amateur Radio Club, Branch 22, on the occasion of the 80th anniversary of the founding of the club. The Branch celebrated the occasion with an anniversary dinner in Blenheim on 5 of November. Well done, and we wish you all the best for the next 80 years.

Finally, may I take this opportunity to extend to you all the compliments of the season and wish you all a very merry Christmas with family and friends and a happy New Year.

Vaughan Henderson ZL1TGC,
President.

Coming up

It is hoped to print the following articles in future issues of *Break-In*.

- Receiver test reports; what do the numbers mean?
- Transmitter test reports; what do the numbers mean?
- Building a 1.2 kW solid state PA for 144 MHz
- Product Review: MFJ-4416B Super Battery Booster
- A three-way coax switch for under $40

Amateur Digital Television Transmissions

by Vaughan Henderson ZL1TGC. NZART President

Many of you will by now have seen the proposed application by the Wellington VHF Group for a Digital Amateur Television Repeater. Information missing from the proposal was the frequencies to be used. Many of you have also asked why has this suddenly appeared? Do we have a new frequency for an ATV repeater to replace the Channel 39 allocation? Has the Channel 39 allocation been retained?

The following background and information will, I hope, provide you with some answers. Our old allocation for analogue television transmissions at 615.25 MHz (Channel 39) has been re-allocated in most parts of the country and will not be available in the future for amateur television use. The frequency now forms part of the new UHF digital terrestrial spectrum. We were advised in 2009 that Government decisions did not provide for Amateur digital television transmissions in the UHF bands, but there was spectrum available post digital switch-over (DSO) of VHF spectrum around 60 MHz (Channel 2). In early 2010 the licence renewal process found only three parties seeking Amateur TV repeater (analogue) licences and these were provided on a temporary basis until DSO.

You may be aware that negotiations have been underway for some time with our regulatory authority, the Ministry for Business, Innovation, and Employment's Radio Spectrum Policy and Planning and Radio Spectrum Management Groups to evaluate some portion of the UHF spectrum for use by radio amateurs for transmitting digital television signals. These negotiations have now reached the stage where the Ministry has been advised that there are a number of interested groups around New Zealand who want to participate and the Ministry has requested evidence that we can in fact transmit digital television signals without causing interference to the holders of the adjacent spectrum.

At the time of publication in Infoline 261, the Ministry's Radio Spectrum Management (RSM) had not allocated a transmit frequency for such a repeater. On the 7th of November, as the result of a meeting between FMTAG Secretary Doug Ingham ZL2TAR and the RSM, a frequency band from 502 MHz to 510 MHz has been chosen to allow the evaluation of amateur digital television transmissions to take place. The input frequency of the repeater will be the same as previously used for analogue television transmissions, 431.25 MHz.

Selection of this frequency band for amateur digital television transmissions means that our "neighbours" in terms of spectrum use is the Land Mobile bands extending up to 502 MHz on the lower side and the bottom channel of the Freeview Television spectrum which begins at 510 MHz on the upper side.

The application from Branch 74 is intended to prove to the RSM and adjacent spectrum users that radio amateurs in New Zealand do have the capability to successfully design, construct and operate a digital television transmitter in the band 502 to 510 MHz without producing interfering out-of-band emissions or degrading the signal to noise ratio of stations in the adjacent land mobile band. As such it will assist in developing licence conditions or other RSM requirements for future use.

The Wellington VHF Group has members with the necessary competence and technical ability to produce the UHF digital television transmitter and to conduct the trial and evaluation of emitted digital television signal. The location, in Wellington for the test transmissions, is also convenient in that those users of the land mobile spectrum who have an interest in ensuring that the amateur television transmissions will not cause interference or degradation also have their head office engineering sections in Wellington. The technical requirements for a digital television transmitter which meets the out-of-band radiation conditions of a commercial digital television licence in New Zealand is not easily achieved. A high level of output filtering is required to meet the stringent technical standard.

Branch 74's aim is to prove that the required performance can be achieved and your Council has every confidence that this will be the outcome. So please bear with us as these trial transmissions take place. The successful outcome may permit other groups around New Zealand to go ahead with the design and construction of similar equipment.

Best wishes for 2012 from HQ

Subscriptions 2012

As I write this, we are in the middle of a membership promotion, therefore figures will appear a little better than last year.

Total membership is at 1839, this includes 1575 Transmitting, 82 Family Transmitting, 17 Student, 27 Overseas, 12 Non-transmitting, 6 Family non-transmitting, 7 Life members, 28 Over 60 year membership, 64 Complimentary, 14 branches, and 7 Associated Societies.

The promotion has brought in some new members, but sadly, many have chosen to return only for the reduced subscription rate and will possibly not renew again next year when a full subscription is charged.

I urge those of you who do have trouble finding the lump sum payment each year to contact me. For as little as $8.25 per month, your Association can continue to look after *ALL* amateur interests. Who knows, if we can achieve a high enough membership, subscriptions may decrease.

Total figures for this promotion will be available in the last issue of HQ Info-line for the year, along with the winner of the ICOM hand held radio.

SMART

RSM assured NZART that their mail-out to all amateurs to have them update records was successful. Having sent out some 3000+ letters myself, to non-members to encourage them to join the Association, I am somewhat doubtful as we still appear to have many listed who are Silent Keys or have simply not updated their records with RSM.

I am still getting a lot of e-mails from people who advise their address details are incorrect in *SMART* or *Call Book*, please, please, please, contact Radio Spectrum Management Group processing centre on 0508 776 463 if your address details are not correct. I am unable to change ANY existing addresses within the RSM database.

Finally…thank you

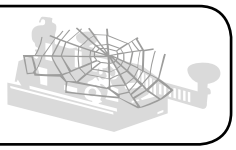
My thanks as always goes to the many who help me in my role throughout the year, special mention is paid to some Councillors who go above and beyond the call of duty by ensuring my mental state remains stable! Also a special lady in Nelson (Topsy) who rings almost every day just to say hello and relieves some of the stresses that a sole position encounters.

Lastly I would like to offer my sincere thanks to you all for your continued support and assistance.

Let's all have a very merry Christmas and prosperous New Year

Debby ZL2DL
Vaughan Henderson ZL1TGC
NZART President

Silent Keys



The Association deeply regrets to record the death of the following members and extends its sympathy to the bereaved.

Silent Keys: guidelines to contributors

Contributors are requested to limit their obituaries to between 200-400 words. Content should focus mainly on the amateur radio activities of the deceased. Normally photographs cannot be included.

Michael Owen VK3KI

The President of the Wireless Institute of Australia, Michael Owen VK3KI, passed away suddenly on September 22, aged 75. Since the 1960's Michael had a significant influence on the development of amateur radio both in Australia and internationally through his involvement in IARU Region 3 where he held the position of IARU Vice-President for 10 years from 1989 to 1999 before becoming Chairman of Directors for Region 3 in 2006. At the time of his death was organizing the Region 3 Conference held in Ho Chi Minh City during November.

He participated in many IARU committees and was a member of the IARU Observer Team at a number of World Radiocommunications Conferences, in particular WRC03, where he was responsible for a major revision to Article 25 which defines the Amateur Service. His skills at drafting papers and being able to clearly articulate proposals at the many World Radio Conferences and Asia Pacific Telecommunications meetings he attended were of immense value to IARU. At WARC-79 he was responsible for drafting the resolution to exempt the Amateur-Satellite Service from coordination procedures that otherwise would have bogged us down in endless paperwork and great expense. Thanks to his legal training and experience, this was just the sort of thing he was good at. His work has stood the test of time, and it remains in effect to this day.

In 2004, Michael led the Wireless Institute of Australia through the progression from a federal structure with state divisions, to an efficient national organization with affiliated local clubs. Through his work, the WIA became highly regarded by government agencies and the Australian Communications and Media Authority for its professionalism and efficiency, especially in relation to the WIA examination and call-sign management service. He championed and guided the introduction of the Foundation License class in Australia, a move which significantly increased the numbers of Australian radio amateurs, while other countries' numbers were declining.

Those of you who have attended our annual conferences will know and remember Michael who was a regular visitor and a true friend of NZART. He was highly respected by all who knew and worked with him, both in his professional career as a lawyer and for his work with Amateur Radio. He will be very sadly missed by a great number of people.

Michael is survived by his wife Nan, who accompanied Michael on many Amateur radio occasions, most recently at the 2012 WIA National Convention in Mildura, and his two daughters. Our deep condolences go the Michael's family and friends.

Vaughan Henderson ZL1T-GCPresident NZART

Maurie Moseley ZL1WU

Maurie became a silent key on 13 October 2012. Maurie was active in Franklin Amateur Radio Club, right from its inaugural meeting on 16 August 1950. In the early days, along with the other young hams, he was part of building the clubhouse in 1954. Maurie was a key organiser of the Club's JOTA efforts in the 1960's when scouts from the Waiuku area were invited, in groups, by rotation to visit and work from ham shacks in Waiuku.

Maurie embraced the evolving techniques of packet radio, the internet and data modes on HF. He took over from Bob Knowles as editor of the Club newsletter "QUA" in November 1996 and continued in that role until 2008. He researched and published a history of the club in 2003. Maurie was a regular operator at AREC communication activities, including horse endurance, Christmas parades, Sand to Mud race and the Waiuku Duck Derby. Maurie became only the third Life Member of the club.

Maurie came up each Sunday morning on our nets;. sometimes with a pause while he sorted out the correct microphone! Maurie encouraged his wife Faye ZL1TMI in radio, and on occasion they both came up on the Powder Puff contest. Sons Pat and Steve also hold amateur calls. He shared his interest in the other hobbies that he took up in retirement. Maurie soon had moved up from a 4 inch to an 8 inch telescope to pursue his interest in astronomy. Wood turning was another interest.

Maurie is sadly missed, and Branch 10 offers its sincere sympathy to Faye and the family.

Tom McDonald ZL1TO
Secretary Branch 10

From the *Break-In* Archives

Compiled by Jim Pye ZL2PU
<jim.pye@jemfamilyresearch.co.nz>

Introduction:

The *Break-In* Archives are a service provided to NZART by J.E.M. Family Research Ltd. The service aims to digitise the early issues of *Break-In* to help preserve, and make available to all, the history of Amateur Radio in New Zealand.

The archive is located at <http://greenstone.jemfamilyresearch.co.nz/break-in>. It is hosted using the digital library software; Greenstone, from the University of Waikato.

Please send any feedback to <jim.pye@jemfamilyresearch.co.nz>

As the issues of *Break-In* are scanned snippets of different Amateur Radio activities are being discovered and noted. It is hoped that this small section will stimulate your interest to explore the early days of radio and Ham activity in New Zealand.

Progress:

The *Break-In* Archives are slowly filling. We have the complete set of the 1932 issues available and progress is well underway on the 1931 issues.

Tip

If you are searching for a call-sign within the *Break-In* Archives, it was common practice in the early years to only have the district and call letters listed in articles etc.; eg. 2PU instead of the full ZL2PU. (not that ZL2PU had been allocated in 1932.)

From the *Break-In* Archives

In the May 1932 issue of *Break-In* a report that Flo Mason had passed her ticket to become the first YL ham in Tauranga.

Q3 Any thoughts on the call-sign she was assigned?
(Answer on page: 44.)
An answer can also be tracked down by searching the NZART *Break-In* Archives at: <http://greenstone.jemfamilyresearch.co.nz/break-in>

In the December 1932 issue of *Break-In* it was reported that earlier in the year the call was sent out asking all Branches to form sections of the REC (Radio Emergency Corps); now known as the AREC (Amateur Radio Emergency Communications).

Q4 There was an amazingly rapid response to the call; do you know how many sections were formed within 10 days?
(Answer on page: 44)
See if you can research the answer yourself in the NZART *Break-In* Archives at: <http://greenstone.jemfamilyresearch.co.nz/break-in

Transmitting Antennas for 500 kHz; Part I of II

by David Conn VE3KL

(Note: This article uses TCA HotLinks to provide access to enriched media from the RAC website. For more information, please go to Nov/Dec <www.rac.ca/tca>.)

Introduction

Many countries including Canada are now issuing authorisation to amateurs for conducting experiments in the vicinity of 500 kHz (600 metres wavelength). These very low frequencies present serious design problems for antenna designers due to size limitations that most amateurs encounter and the fact that the rules for operation are set up to assure that there is a minimum of interference with other users of these frequencies. However, there is a wealth of information that we can draw on from the broadcast community to help us design useful antennas near the AM broadcast band. Also, amateur work in the 137 kHz band has been extensive and provides us with the analysis of many antenna types including vertical monopoles, Inverted L, many variations of top loaded monopoles and loop antennas.

Part I of this series focuses on the radiation resistance of several possible antennas that can be used at 600 metres while part II fills in important details including, a discussion of bandwidth, efficiency and the simulation of these antennas using the NEC-4 engine that is capable of analyzing antennas that use buried radials and contain horizontal elements that are mounted close to the ground.

Some of these antennas are reasonably small and can be used in urban environments while others are quite large but not as big as AM broadcast antennas which are usually well beyond the scope of most amateurs. The candidate antennas under consideration are:

The vertical monopole antenna (several sizes)

The vertical monopole antenna with top hats (top loaded with many variations)

Cage type vertical antennas with multiple feed points (with and without top hats)

Background

The main design issues with 600 metre antennas are:

- The radiation resistance
- Resistive losses caused by non-perfect ground and wire resistance in the antenna and its matching structures
- The operating bandwidth
- The design of matching structures, and
- The antenna gain

Radiation Resistance

Radiation resistance is that part of an antenna's feedpoint resistance that is caused by the radiation of electromagnetic waves from the antenna. The radiation resistance is determined by the geometry of the antenna; not by the materials of which it is made. It can be viewed as the equivalent resistance of a resistor in the same circuit. In this discussion, it is assumed that the current is described by a sine wave (a carrier) with a peak value of I_o. Some of the literature uses the Root Mean Square (RMS) value of the current but most antenna text books use to the peak value ($Irms = I_o/\sqrt{2}$).

It is the radiation resistance of an antenna that does the work for us. Our solid state transceivers are designed to operate into a 50 Ohm load so antennas that have a 50 Ohm radiation resistance are well suited for our applications. However, very short vertical antennas have a very low radiation resistance making them difficult to match into our transceivers. They also have a large capacitive reactance making the problem even worse. The capacitive reactance has a big negative impact on the operating bandwidth of the antenna. So, we are looking for antennas that have a radiation resistance as close to 50 Ohms as possible combined with a small reactance.

Antenna Efficiency

The efficiency of a transmitting antenna is the ratio of the power radiated from an antenna to the power supplied to it by the transmitter. The efficiency is not 100% because of resistive losses in the antenna structure and ground. Efficiency is expressed as:

$$\epsilon = \frac{Rr_{ad}}{Rr_{ad} + R_{loss}}$$

Where Rr_{ad} is the radiation resistance and R_{loss} is the loss resistance.

In the HF bands, the efficiency can be close to 100% but this is not the case for very short antennas that we are forced to use at 500 kHz. In many cases, the radiation resistance is only 1 or 2 Ohms while the loss resistance can be 20 Ohms. For the 1 Ohm case, this results in an antenna efficiency, $\epsilon = 1/(21) = 0.047$ *[(4.7%) (-13.3 dB)]*

When losses due to real matching structures are added to these numbers, the situation gets worse. For example, antenna tuners that are required to match 1 Ohm to a 50 Ohm transmitter can easily have a loss of 8 dB.

Notice from the above formula, that the antenna efficiency varies directly with the radiation resistance for the cases where loss resistance is much greater than the radiation resistance. This means for example that an antenna with a 5 Ohm radiation resistance will radiate 10 times the amount of power compared to an antenna with a radiation resistance of 0.5 Ohms when matched to the same transmitter.

Six Case Studies

Now, let's consider the radiation resistance of several cases that are relevant to our situation:

- a small current element,
- a small horizontal dipole mounted in free space,
- a small vertical monopole mounted over a perfect ground,
- a small vertical monopole with an ideal top hat mounted over a perfect ground
- a cage type vertical monopole, no top hat, and separate feed points for each monopole.
- a cage type vertical monopole, with a top hat, and separate feed points for each monopole

The Small Current Element

The basis for all of our antenna calculations is a fictitious radiating element that consists of a short wire located in free space that carries a uniform current. Real antennas are then made by connecting many of these small elements together and adding a transmitter source to some part of the antenna.

The radiation resistance1 of this current element is give by:

$$Rr = 80\pi^2\left(\frac{L}{\lambda}\right)^2\Omega$$

Where Rr is the radiation resistance, L is the length of the antenna element and λ is the wavelength. Here it is assumed that the antenna length, L, is much smaller than the wavelength λ.

The power radiated from the element is:

$$Power = 1^2{}_0R_r/2 \text{ [Watts]}$$

For example, consider the simple case where the length of the wire equals 1/20 th of a wavelength and the current, I_0 =100 mA. Then, Rr = 1.97 Ohms and the radiated power = 9.87 mW.

Rr is a small number and we cannot completely escape from this level of radiation resistance until we either use bigger antennas or more complex ones such as cage type vertical monopoles. We will not consider the classic quarter wave vertical monopole for this application since it would be 150 metres high.

A Short Dipole; mounted in free space

The radiation resistance of a short dipole is different than the simple wire since the current distribution varies along the antenna. The current is nearly zero at the end of the antenna and varies linearly along the antenna. In this case the radiation resistance is given by:

$$Rr = 20\pi^2\left(\frac{L}{\lambda}\right)^2\Omega$$

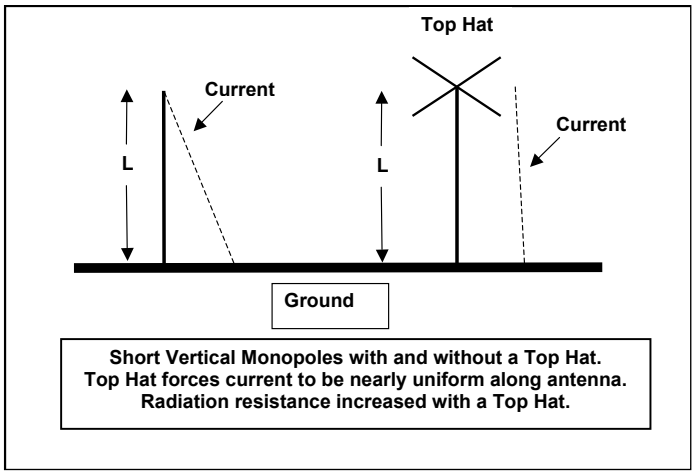


Figure 1: Short Vertical Monopole Antennas

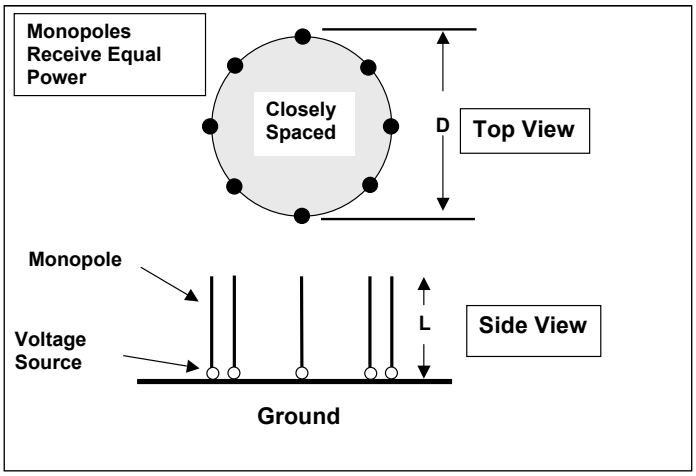


Figure 2: Cage Type Vertical Monopole Antennas with N Feed Points

The radiation resistance of the short dipole is even smaller than a current element of the same length. For this and other reasons, the horizontal dipole does not make a good antenna for very low frequency applications.

For example, consider the simple case where the length of the dipole equals 1/20th of a wavelength as before. Then: Rr = 0.493 Ohms.

A Short Vertical Monopole; mounted over a perfect ground plane

The radiation resistance of a short vertical monopole, see Figure 1, mounted over a perfect ground plane is given by:

$$Rr = 40\pi^2\left(\frac{L}{\lambda}\right)^2\Omega$$

This is twice the value of a short dipole but is still a small number. Rr equals approximately 1 Ohm for the case where L/λ = 0.05 (30 metres). The real antenna that is mounted over a lossy ground will have a much higher terminal resistance than 1.0 Ohm which we will see later. Antenna and ground losses will have a dramatic affect on the efficiency of this antenna.

A Short Vertical Monopole with Top Hat; mounted over a perfect ground plane

A significant improvement is made by employing a top hat, sometimes called top loading, to the vertical monopole, see Figure 1. The top hat performance depends on the number of elements used and their length. It is assumed that there is an even number of top hat elements and that no radiation is caused by the top hat. In this case the radiation resistance of vertical monopole using an ideal top hat is given by:

$$Rr = 160\pi^2\left(\frac{L}{\lambda}\right)^2\Omega$$

Here, the radiation resistance is eight times that of the short horizontal dipole which improves the situation considerably.

A Cage Type Vertical Monopole No Top Hat (STAR-H Antenna, patented)

The impedance of a simple short monopole can be increased by constructing a cage type monopole (see Figure 2 and TCAHotlink,1). This antenna consists of N closely spaced monopoles that are fed at the base with equal in-phase voltage sources. The radiation resistance of each element is increased by a factor of N compared to the individual radiator. In this case, the radiation resistance is:

$$Rr = 40N\pi^2\left(\frac{L}{\lambda}\right)^2\Omega$$

The multiplication factor N is caused by the same coupling physics as in the folded dipole where the factor is equal to 4. The folded dipole has an impedance of four times that of a halfwave dipole.

For the case of $L/\lambda = 0.05$ and N = 12, the radiation resistance R_r = 12 Ohms. This value is quite easy to work with but still needs a rather high antenna.

One advantage of using this type of antenna is that the number of towers that is used does not depend on the number of elements N in the cage.

A Cage Vertical Monopole with a Top Hat

This antenna is very similar to the cage antenna without a top hat and in its simple form can be constructed with two towers. In this case (assuming an ideal top hat) the radiation resistance is given by:

$$Rr = 160N\pi^2\left(\frac{L}{\lambda}\right)^2\Omega$$

R_r now contains the multiplication factors 160 and N. For the case of $L/\lambda = 0.028$ (17 metres) and N = 6, the radiation resistance $Rr = 7.43$ Ohms which is ideal since the six elements must be connected to a single transmitter. Connecting and matching six active elements to a transmitter poses a small problem compared to building a very large antenna. Note that the formula presented above provides us with a direction for selecting an antenna configuration but there is much design work to be done before a practical antenna can be realized.

Design Graphs

The formulas given above are presented in graphical form in Figures 3, 4, 5 where the radiation resistance is plotted against the antenna length, L, for all cases discussed.

Figure 3 shows the radiation resistance of the four basic antenna elements: the short dipole, vertical with no top hat, the basic current element and the vertical with a top hat.

Notice that the vertical scale has a maximum value of only 5 Ohms. The vertical antenna (no top hat) of length equal to 0.05 λ (30 metres) has a radiation resistance of 1.0 Ohms while the vertical antenna of the same length with an ideal top hat has a radiation resistance of 4 Ohms making it much easier to match into 50 Ohms. The short horizontal dipole has the lowest radiation resistance of the quartet and does not make a good candidate for this application.

Figure 4 shows the radiation resistance of the cage type antenna with no top hat for various values of N, the number of radiating elements. Notice, for N = 10 the radiation resistance

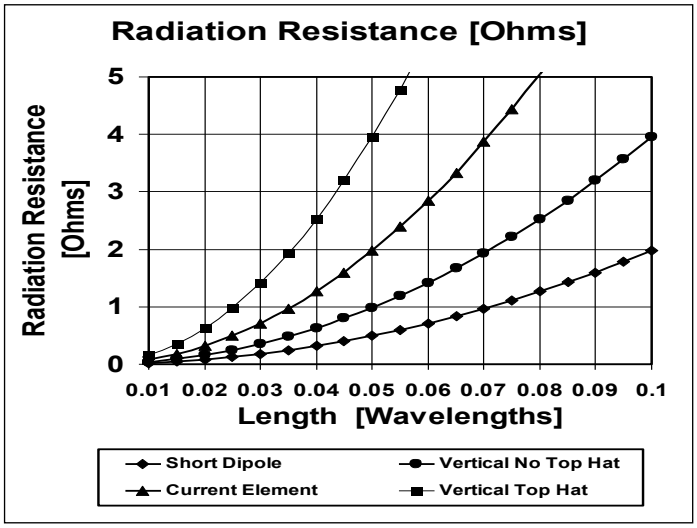


Figure 3: Radiation Resistance of Basic Antennas

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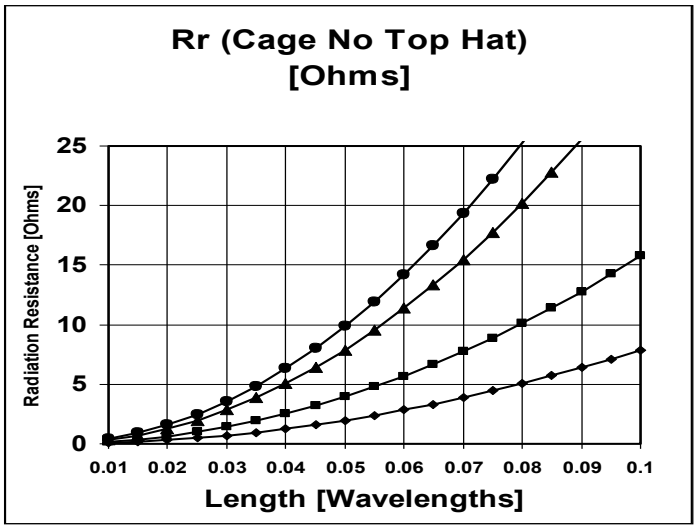


Figure: 4 Radiation Resistance of Cage Antenna no Top Hat.

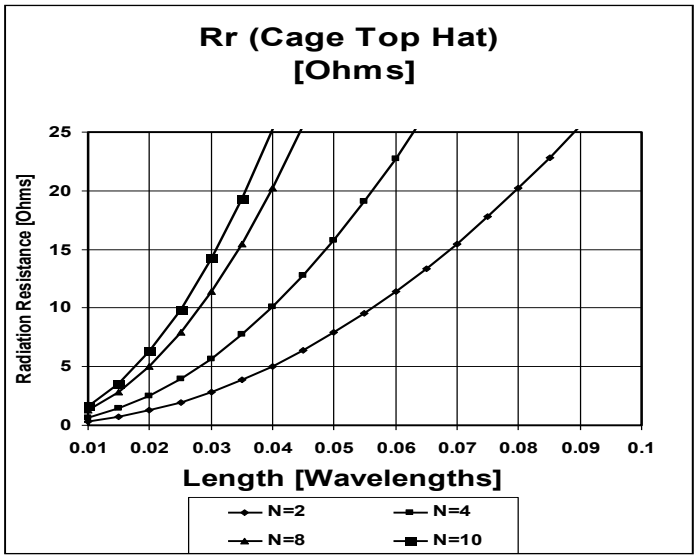


Figure: 5 Radiation Resistance of Cage Type Antenna with Top Hat.

is 10 Ohms for an antenna length of 0.05 λ. The radiation resistance approaches 4 Ohms for a length of 0.03 λ. This is vastly superior to the small vertical antenna of the same length.

The final graph, Figure 5, shows the radiation resistance of a cage type vertical with an ideal top hat for various values of N. The results presented here show great promise. An antenna length of only 0.02 λ (12 metres) has a radiation resistance of approximately 6 Ohms while bigger antennas produce a radiation resistance around 15 Ohms. The easiest antenna to construct would be the one for N = 2. In this case, an antenna 0.04 λ (24 metres) high antenna has a radiation resistance of 5 Ohms.

Conclusions

Part I of this series focused on the issues of achieving a large radiation resistance which will aid in producing a reasonable efficiency and operating bandwidth. Part II in the series will look at the same antennas in more detail so that we can determine the efficiency and bandwidth of these antennas.

There has been a great deal of work done (see TCA Hotlinks, 1, 2, 3, 4, 5 and 6) on Low-Band antennas. The most significant work to date on broadcast antennas was done by Star-H Corporation (TCA Hotlink, 1) where they developed a low profile cage type antenna that was described in this article. TCA Hotlink, 2 by ON7YD is highly recommended. It contains a complete discussion of many antenna types such as: helical antennas, spiral top loaded antennas, capacitive top loading on a single tower antenna and much more. The article also discusses the disadvantages of the horizontal dipole for the LF bands and explains how to measure the radiated power of these antennas. It also contains a wealth of information through its links to other work.

The classic book by ON4UN (see TCA Hotlink, 6) is indispensable for antenna designers who are interested in Low-Band antennas and systems. It also covers many of the basic concepts such as the effective height of an antenna.

It is well worth looking at the very impressive 500 kHz antenna of Gunnar Ivarsson, SM6BGP and his Web site (see TCA Hotlink, 5). Gunnar uses a base insulated tower that is 24 metres high. It is insulated at the base with four precision machined Delrin insulators. There is a beautiful photograph of the antenna on his web site which was taken at sunset in December. Gunnar reported to me that the impedance of the antenna at its base before matching is 22 Ohms. Under some conditions, he uses the transmitter as a beacon at 501.4 kHz.

There are many other considerations to explore with these antennas including, input impedance, bandwidth, efficiency and the design of matching structures. Ordinary methods of matching these antennas are not very practical for amateurs and we must devise simple, low cost methods. For example, it is quite common to employ quarter wavelength lines to match impedances but in this case the lines would have to be extremely long.

Further Study Using TCA Hotlinks

Further information is provided with TCA Hotlinks which are easily accessed via the RAC website. For this information, please visit <http:// www.rac.ca/tca.> Hotlinks make it unnecessary to type URL addresses into your computer and provide you with calculators and other support that demonstrates the ideas presented in the articles. The following hotlinks for this article are available on the RAC site.

TCA Hotlink 1 A Novel Short AM Monopole Antenna with Low-Loss Matching System. <http://www.kintronic.com/resources/technicalPapers/2.pdf>

TCA Hotlink 2 Antennas for 136 kHz <http://www.qsl.net/on7yd/>

TCA Hotlink 3 Short Medium Frequency AM Antennas. <http://www.scribd.com/doc/34927150/Short-Medium-Frequency-AM-Antennas-by-Valentin-Trainotti-Senior-Member-IEEE-September-2001>

TCA Hotlink 4 Symmetrical Top Hats, <http://cebik.com/content/gp/hatp.html>

TCA Hotlink 5 500 kHz Antennas SM6BGP <http://500khz.se/>

TCA Hotlink 6 ON4UN's Low-Band Dxing text book <http://www.arrl.org/>

Acknowledgments

The author wishes to thank STAR_H Corporation for giving permission to study and experiment with their patented antenna that is described in TCAHotlink 1. This novel antenna increases the radiation resistance and efficiency compared with standard short monopoles.

Thanks are also due to ON7YD and SM6BGD for the work they have done in this area of antenna development.

Until later, VY 73

David, VE3KL

References

Fields and Waves in Communication Systems; Ramo, Whinnery, Van Duzer; John Wiley, Third Edition, page 602

Contributions to *Break-In*

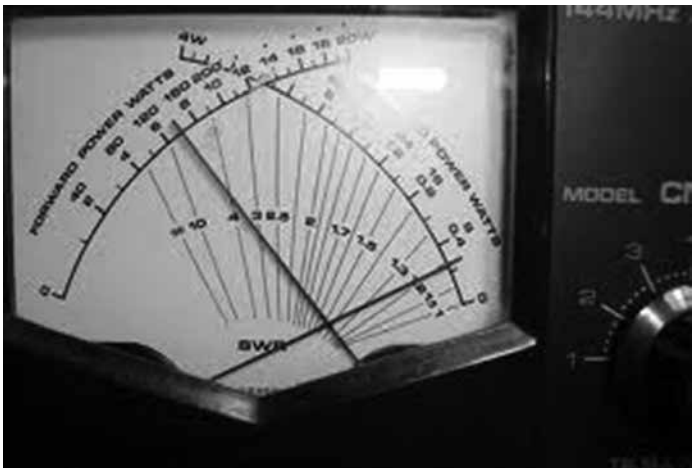
Break-In is a forum for NZART member's amateur radio projects, experiences, opinions and news. Your contributions and feedback is welcomed. Contact the Editor John Walker ZL3IB at <john.zl3ib@ihug.co.nz>

Next deadline for copy is
10 January 2013

SWR myths and mysteries

by Andrew Barron ZL3DW

This article will explain some of the often misunderstood facts about antenna SWR at HF and uncover some popular misconceptions. The questions are; what really happens in a mismatched antenna system, how much power is radiated and what happens to the rest? Is high SWR always bad? Will high SWR blow up your transmitter and how does an antenna tuner really work?



There are many books written about transmission lines and antennas and the mathematics dealing with complex antenna impedance and transmission line behaviour are fairly complex, I will attempt to explain the basics while keeping the article a 'maths free zone'. If you want to get into the details there is a lot of information on the Internet and also the ARRL and RSGB handbooks.

So what happens in the real world?

Step 1: RF energy from your transceiver travels down your feeder cable (usually coax cable these days) towards the antenna. On the way some of the energy is lost as heat due to the cable loss of the coax cable. Better coax types have less loss. Coax cable loss is measured in decibels (dB) and is greater at higher frequencies. So a coax cable that is OK for HF 1-30 MHz may be poor at VHF or UHF frequencies.

Step 2: When the energy reaches the antenna, some of the energy is radiated, a very, very, small amount is absorbed by antenna components and dissipated as heat, and the rest is reflected back down the feeder cable towards the transmitter again. There is no loss due to the reflection; +99.9% of the system losses are due to the coax. If the antenna is a good match for the feeder and transmitter i.e. has an impedance of around 50 Ohms then most of the power will be radiated, which is good.

Step 3: The voltage of the RF energy travelling back towards the transceiver is not in the same phase as the RF voltage travelling towards the antenna. The addition of the two voltages causes high voltage (low current) and low voltage (high current) nodes at regular distances along the feeder cable. In extreme cases with high power transmitters this can cause voltage breakdowns or hot spots along the feeder. This regular pattern of voltage nodes is called a 'Voltage Standing Wave'. The ratio of the peak voltage to the minimum voltage is the 'Voltage Standing Wave Ratio' or VSWR usually shortened to SWR.

Step 4: Some of the RF energy reflected back towards the transceiver is lost as heat due to the cable loss of the coax cable.

Step 5: When the RF reaches the antenna tuner or the transceiver final stage, some energy is absorbed as heat but almost all of the energy is reflected back towards the antenna again! Contrary to popular opinion the RF power reflected back even from a very bad match such as an open or shorted feeder will NOT damage the final of your transceiver. I will explain what can cause your rig serious damage later, so keep reading.

Step 6: The energy reflected back towards the antenna joins the energy generated by your transmitter and the energy being reflected from the antenna, but again the phase is different and this affects the standing wave. The effect is small because having lost energy on the way to the antenna, and then on the way back to the transmitter the RF power of the now twice reflected wave is quite small. When the energy finally reaches the antenna (for the second time) it has been attenuated by the cable loss again. Again some of the energy is radiated and some is reflected… go to step 3 and repeat until all of the energy has either been lost as heat in feeder loss or radiated by the antenna.

Here is an example using approximate values for a typical feeder loss of 1 dB and an antenna with an SWR of 2:1. 100 W is sent out from the transceiver; just over 20 W is lost due to the 1 dB feeder cable loss so 80 W reaches the antenna where due to the mismatch causing the 2:1 SWR around 70 W is radiated and 10 W is reflected back. By the time the 10 W reflected signal reaches the transceiver through the 1 dB feeder cable loss it has reduced to around 8 W which is reflected back towards the antenna. When the 8 W reaches the antenna it is down to around 6 W. 5.6 W of that is radiated and the remaining 0.4 W is reflected back towards the transceiver again. So out of the 100 W you originally put into the antenna feeder, about 75.6 W is radiated, the rest is lost as heat, in the coax. Because of these multiple reflections, high SWR causes the feed line losses to be multiplied, so low loss feed line causes less power to be lost in a mismatched system than high loss feed lines.

What is Return Loss?

Engineers usually use Return Loss instead of SWR. Return loss is the difference, in dB, between forward and reflected power measured at any given point in an RF system and, like SWR, it does not vary with the power level at which it is measured. Return Loss has a fixed relationship to SWR but is expressed in dB which makes it easier to use in calculations. For the same reason, Engineers often refer to RF power in dB relative a fixed level usually a milliwatt (dBm) or Watt (dBW), rather than using Watts. The lower the SWR is, the higher the Return Loss. For example an SWR of 2:1 is equivalent to 9.5 dB RL and an SWR of 1.1:1 is equivalent to 26 dB RL. A perfect (but unachievable) 1:1 SWR is equivalent to a Return Loss of infinity. In the real world an SWR better than 1.5:1 (RL = 14 dB) is acceptable and an SWR better than 1.2:1 (RL = 21 dB) is pretty good.

Most SWR meters do not actually measure the voltage maximum and minimum nodes along the transmission line. They actually measure the forward and reflected power, normally by rectifying the voltage across load resistors on a directional coupler, so in reality they are measuring the return loss. But as there is a known relationship between return loss and SWR the meter can be calibrated to display SWR. Cross-needle SWR meters read forward power on one meter and reverse power on the other meter. The intersection of the two meters (where the pointers cross) is calibrated to show SWR or Return Loss, or both.

All antenna loads have either capacitive or inductive reactance in addition to resistance. The combination of the resistive load and the reactive load is the antenna (complex) impedance. This means that the load as seen at the transmitter looks like a combination of a resistance and an inductance or capacitance. In a 'good' well matched antenna the resistance will be close to 50 Ohms and the inductance or capacitance will be near zero. This is called resonance and is usually arranged to be in the centre of the band or may be offset slightly towards the CW or SSB portions on the band. At the band edges the SWR is typically slightly higher, the resistance is slightly higher or lower than 50 Ohms and there may be a small amount of either

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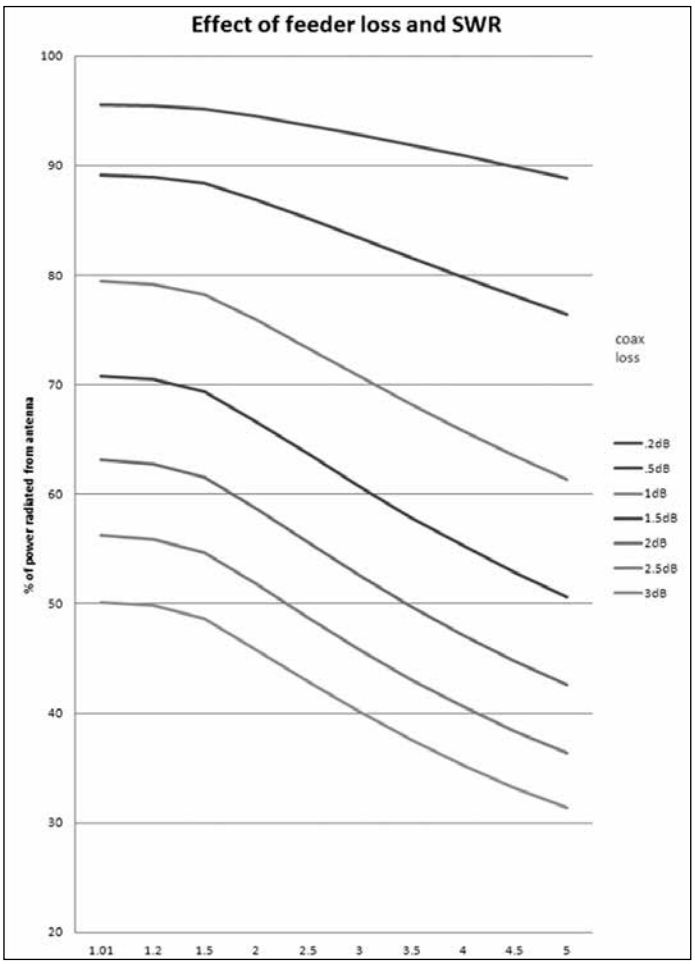
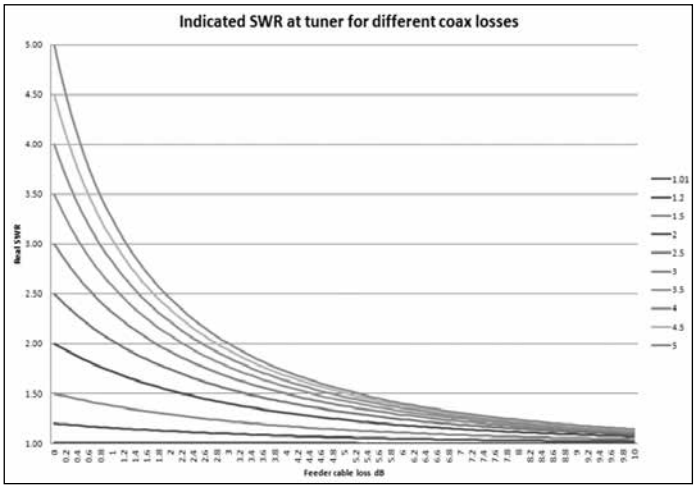




capacitive or inductive reactance.

You can see from the earlier example that the 8 W of reflected power that gets back to the transmitter will not cause any major problems so what can cause damage to your transceiver if you have high SWR? The problem is not the power reflected back from the mismatched load or antenna. In fact transmitting after failing to connect an antenna to your transceiver would cause 100% reflections but would probably not damage the transmitter finals (don't try this at home). But running the transceiver into a length of coax cable with a short circuit on the end, or a faulty antenna, non resonant antenna, or no antenna (open circuit) is exceptionally dangerous. The culprits are the standing wave and the complex impedance. Remember I said that the standing wave results in high voltage nodes at regular distances along the coax feeder? The voltage at these nodes is the (vector) sum of all of the signals being sent and reflected back and forwards along the cable. The voltage peaks could be very high. If due to the particular load impedance, RF frequency, and length of the transmission line (coax feeder cable), one of the voltage peaks happens to occur right at the transmitter end of the cable, there could be excessive RF voltage appearing at the transmitter output stage. This could cause flash over or RF breakdown across final transistors, inductors or capacitors. The risk of this is unpredictable you could get away with it 100 times on one frequency and then blow the rig at a different frequency. A voltage null at the transmitter end of the cable would cause high current to flow which could also damage the rig, but this situation is less dangerous than the high voltage event because it would probably trip the SWR protection in the rig.

Standing wave voltage is not the real baddy though; the other nasty is the complex impedance. As I said earlier all antenna loads have either capacitive or inductive reactance in addition to resistance. In a well matched antenna the capacitive or inductive reactance is balanced out leaving a mostly resistive load. But in a poorly matched system such as short circuit, faulty antenna, non-resonant, or no antenna there will be a lot of capacitive or inductive reactance. This is transformed by the transmission line (feeder cable) and appears to the transmitter as if you have connected an inductor or capacitor plus the resistive component across the output. Note that due to the length of the transmission line a capacitive reactance at the antenna may look inductive at the transmitter and vice versa. The effect of adding capacitance or inductance at the transmit output stage is to de-tune the final. In a valve output stage like a linear amp this can cause the same sort of flash over events as a voltage standing wave peak. In a transistor final it can cause excessive current and burnout the transistors. Less severe detuning will cause mismatch between the transmitter output and the coax feeder, resulting in mismatch loss and reduced output power being delivered to the antenna.

If you are using non resonant antennas or antennas designed to present a higher or lower impedance than 50 Ohms, you should always use an Antenna Tuner. Actually an antenna tuner in the shack does not tune the antenna; it is really an antenna matching unit. It is not capable of altering the impedance or resonant point of the antenna. To actually 'tune' an antenna you must change its physical or electrical length or other parameters, for example the Steppir® antenna controller adjusts the length of the elements and so the Steppir controller could legitimately be called an antenna tuner. The same would apply to a screwdriver antenna controller or the remote tuned capacitor on a magnetic loop.

There is great controversy about whether an antenna tuner actually does 'tune' the antenna. Some very experienced PhD qualified experts insist that they do. I think that the issue is whether we are referring to the radiating part of the antenna or the total antenna system including the (hopefully) non-radiating feed line, tuner, and transmitter. I believe that the experts who state that the tuner makes the antenna resonant are assuming the tuner or matching arrangement is at the antenna end of the feeder coax and in that case it is true that the tuner matching capacitor(s) and inductor(s) affect the electrical length of the antenna to bring it to resonance in much the same way as the gamma or other match on the antenna itself. But that resonant point may not be a 50 Ohm match although the inductive or capacitive reactance will be balanced out at resonance. If the resonant point is not a 50 Ohm match the tuner may tune away from the resonance point slightly to better match the transmitter and feeder to the antenna. A tuner located at the shack sees a complex impedance that been transformed by the transmission line. This is dependent on the length and impedance of the transmission line and will normally be completely different to the complex impedance at the antenna. The tuner in the shack matches the complex impedance on its input to the transmitter and this does not necessarily bring the antenna to resonance. You can prove this by placing an SWR meter between the tuner and the antenna. When 'tuned' you can have a good match to the transmitter but there may still be higher SWR on the antenna side of the tuner. This would not be the case if the antenna was resonant.

If you can't match an antenna

using the tuner in your shack, you can use the transmission line transformation to your advantage. Add a few metres of additional feeder cable and the complex impedance seen at the tuner will be different which may allow you to find a match within the range of your tuner. Sometimes this trick can be used to allow you to use a non-resonant antenna or an antenna cut for a particular band such as 10 m, 20 m, 40 m or 80m on a non-harmonically related band such as 12 m, 17 m or 30 m.

The antenna matching unit in your rig or the shack (usually known as a tuner) uses inductors and capacitors to transform the complex impedance of the feeder and antenna so that the transceiver sees a mostly resistive (not capacitive or inductive) load at around 50 Ohms. The section of feeder coax between the radio and the tuner has no standing wave so there is no risk to your transceiver. The section of coax between the tuner and the antenna may still have a standing wave because the coax feeder is a different impedance to the complex impedance of the antenna load, however high SWR does necessarily not mean a lot less signal is being radiated.

Where the tuner is located is a balance between convenience and performance. If the tuner is placed at the antenna end of the feeder, the whole feed cable is matched so there are no multiple reflections causing increased feed line loss. In other words in a high SWR situation more power will be radiated if the tuner is at the antenna end. But a tuner at the antenna is not very convenient to adjust unless it is a fixed match for a mono-band antenna, a remote tuned matching arrangement, or an auto tuner. A manual or auto tuner at the transceiver end or internal to the transceiver allows you to adjust the SWR match more easily without worrying about remote power feed and control lines, weatherproofing and temperature issues.

While researching this article I came across a rather funny posting on a web blog which pointed out how misunderstood this subject often is. The ham stated that he had a tuner in the shack with a built in SWR meter followed by another SWR meter and that most often the two meters did not agree. On some occasions the tuner read an SWR of 1:1 and the meter on the coax between the tuner and the antenna read more than 2:1. There were many uninformed and confusing replies to this posting until someone pointed out that this is entirely normal and exactly what you should see. Of course, if he had placed the meter on the coax between the rig and the tuner then both meters would agree.

It is possible for your SWR meter to be showing a good SWR but for the antenna to perform poorly. Here are two common complaints. 'I upgraded my feeder to a better type of coax but my SWR got worse, what happened?' and 'I added more radials on my vertical antenna but my SWR got worse, what happened?' The answer is either high coax loss or often in the case of short vertical antennas high ground loss. If the coax loss is high the amount of reflected energy arriving back at the tuner or transceiver is low, so the antenna looks like a better match than it really is. Changing to a low loss coax exposes the poor antenna. For a 3dB feeder loss in a system with a real SWR of 5:1 the indicated SWR at the tuner in the shack is 1.97:1. In a system with a real SWR of 100:1 (a really bad termination like an open or shorted feeder) the indicated SWR of 2.93:1 at the tuner in the shack still does not look too bad. The cable loss is effectively hiding the problem. Another classic example is the ¼ wave vertical antenna with insufficient radials which may present a good SWR. Adding more radials will dramatically improve the antenna performance but the reduced impedance at the antenna feed point due to the improved earth plane will cause the SWR to increase. A basic ¼ wave antenna with a good earth plane should be around 36 Ohms. I have seen commercial antennas advertised that require 'a minimum of 40 ft of coax feed'. The manufacturer is using coax loss to hide poor antenna design and matching! In the case of the ¼ wave vertical it hides the mismatch caused by having either a good earth system or a poor earth system.

The final word is;

- High SWR at the transmitter can damage your rig because the final amplifier will be de-tuned possibly causing a high voltage or current situation in the final stage of the transmitter. Using an antenna tuner will protect the rig by transforming the antenna and feeder complex impedance back to where it should be.
- High SWR will not significantly reduce your power, provided you are using an antenna tuner to protect your transceiver, and your coax loss is low.
- High loss coax can really reduce your output power. Even in a well matched antenna system a coax with a 3 dB loss will waste half of your transmitter power as heat, allowing the antenna to radiate the other half.
- High feeder loss and high SWR multiplies the coax loss, causing very little power to be radiated. For example, if you have a low loss feeder of 0.2 dB, the radiated power from a 100 W transmitter reduces from 95.5 W at an SWR of 1.01:1 to 88.8 W at an SWR of 5:1. That is only an additional 0.3 B loss due to the poor SWR. Compare that to a feeder loss of 3 dB. You have already lost half your power in feeder loss and the poor SWR costs you an additional 2 dB leaving you with a measly 31.3 W being radiated from the antenna.

High feeder loss makes the effect of high SWR worse

High feeder loss masks the effect of high SWR by indicating a better SWR than really exists. βi

Break-In 50 Years Ago βi

Craig Crawford ZL3TLB

***Break-In* 50 Years Ago – November 1962**

1962 Statistics

A recent IARU calendar contains a wealth of statistical data obtained from 59 member societies. From this data some interesting comparisons were noted:

Number of Amateur Stations.

Ten countries have a larger number of licensed amateurs than New Zealand.

	Country	No. of Stations	Society Members
1	United States	244,557	82,000
2	Japan	22,000	7,600
3	Great Britain	10,390	7,000
4	Brazil	9,000	4,000
5	Canada	9,000	2,709
6	Germany	8,724	6,686
7	Argentina	7,000	1,500
8	Australia	4,179	2,230
9	France	2,710	1,360
10	South Africa	2,553	1,460
11	New Zealand	2,500	1,450

Many countries have a very small number of stations, 14 having less than 100.

Maximum Power Input

Power inputs permitted by major amateur countries of the world are as follows:

USA	1000 watts
Japan	500 watts
Great Britain	150 watts
Brazil	1000 watts
Canada	750 watts
Germany	250 watts
Argentina	1000 watts
Australia	150 watts
France	
South Africa	100 watts
New Zealand	100 watts

Break-In 1947 and 1948.

Two Way Mobile Tests via High Voltage Transmission Lines (HVTL)

© 2012 Steve Fogerty ZL2ASF <s.fogerty@ieee.org>

Readers may remember the article "Propagation by High Voltage Transmission Lines" I wrote in Break-In Sept/Oct 2009, with corrections to "as printed" errors in Break-In Nov/Dec 2009.

To recap briefly –

- The discovery of the effect of receiving greatly enhanced MF and LF signals where the receive antenna is under a HVTL. The same HVTL is within a few kilometres of a MF or LF transmitter at a distance.
- The mode is that of a "leaky transmission line".
- The enhancement is extremely large, often producing much higher level strengths than an ideal sea water path.

OR

- To a very distant transmitter nowhere near the HVTL by "antenna effect" to the large HVTL line. The effect is smaller but still very significant.
- Polarisation for the LF/MF frequencies is vertical with a large degree of polarisation purity.
- Both the HVTL and mobile whip are vertically polarised.
- The Beverage antenna is the closest antenna relative to HVTL at LF/MF but certainly not an equivalent.
- Nothing on the subject had been discovered on the internet or in print, so we took a lot of measurements from various sites and transmitters to establish the magnitude of the effect.

HVTL Mobile to Mobile tests by the "leaky transmission line effect"

Eventually this year we were able to get a mobile setup operational and enlist the help of Grant ZL2BK. The plan was to test on most amateur bands from 160 m up to 2 m and carry out tests and measurements between two distant locations where signals would not by other means be heard during the day for mobile to mobile stations.

We selected a location near Stoke, a few kilometres south of Nelson City and another near Renwick (Blenheim) for ZL2BK. Both locations are under the same HVTL of course.

The prediction from previous tests were that it would work very well on 160m and less so above that, but just how far up in frequency would it work?

After three days of rain the day came with fine weather and both stations were set up for 160, 80, 40, 20, 15, 10, 6 and 2 metres.

We used a modified commercial land mobile 2 MHz helical antenna with adaptors to fit on a Hustler base for 160 metres. Hustler resonators and whips were used for 80, 20, 15 metres, a full quarter wave on 10 metres, and a magmount quarter wave on 6 and 2 metres. ZL2BK used his military style screwdriver antenna for 160 – 6 metres.

Talk back for coordination was the Top of the South 2m link. Both stations ran 100W SSB on the MF/HF bands.

We began on 160 metres with spectacular results. Grant ZL2BK's signal was peaking S9+42dB on the Icom 7600 S meter! I asked Grant how our signal was and he said "That's the strongest signal I've heard from anyone anywhere!"

On to 80 metres, again excellent S9+20 dB signals received from ZL2BK.

Then to 40 metres, S9+10dB received.

Nothing was heard on 20, 15, 10, 6 and 2 metres.

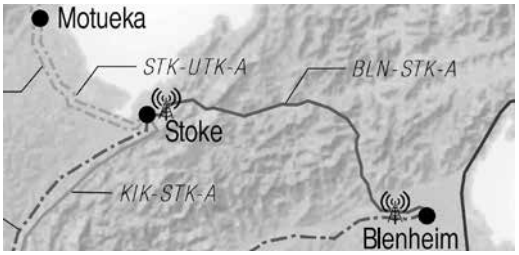
For the Engineers and Technicians

Hard measurements with the Eddystone 40A measuring receiver were taken for each band and checked before and after against a Rohde & Schwarz signal generator. Test power levels were at 35W carrier power and scaled up to normalise to 100W. The measurements are accurate to less than 1 dB.

The signal on 160 metres was 2dB stronger than the perfect free space path of the same length between isotropic sources, which is truly remarkable.

On the day just 100 mW transmitter power would have been plenty to communicate, or much less than that if the noise level, after three days of rain, had been lower. Later in the day we tried AM and FM on 160 metres, all were excellent.

So given the extremely high signal level on 160 metres, would this be the largest signal ever received between these two points? Certainly so, as there is no normal radio mechanism of the same power that could exceed that signal level, nor would any path over perfectly conducting ground or sea water of the same distance be better.



Map showing transmission sites

Signal levels

160m	-24 dBm	83 dBµV (50Ω)	14125 µV (50Ω)
80m	-37 dBm	70 dBµV (50Ω)	3160 µV (50Ω)
40m	-50 dBm	57 dBµV (50Ω)	707 µV (50Ω)

ZL2ASF and ZL2BCG near Stoke, Nelson.

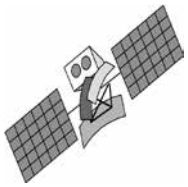
Eddystone 40A receiver used for precise signal measurements.

YouTube Movie Clip

We made a short movie clip from the events of the day, together with

CALL FOR PAPERS

Technology Convention, Easter, Auckland 2013



Planning for the Technology Convention to be held at the Western Springs Garden Community Hall, Auckland, during March 30 and 31 (Easter) 2013, is well under way. The time has come to call for papers for presentation at this convention.

At this stage a brief synopsis of no more than two paragraphs (approximately 150 words) about the proposed subject is required. The subject content should be about developing technology in communications, be it voice, data, control technology, or anything relevant to modern electronic communication techniques.

Synopsis can be sent by Email to <conventionpapers@aucklandvhfgroup.org.nz> no later than September 30 2012.

Note: Not all synopses received may be accepted for the convention. This will be decided by the number received and how much time is available through the Easter weekend, and the relevance of the subject proposed. A more detailed proposal of the presentation could also be required at the beginning of November 2012 for the purposes of allocating time slots during the Easter weekend and planning of facilities.

Election of President and for the Executive Council To be held March 2013

Notice of appointment of Returning Officer
(Given in accordance with the Constitution of NZART)

I, Evan Sayer, inform members that Council of NZART, having recently directed that an election be held for the office of President and for the Executive Council of NZART in March 2013, have appointed me, to be the Returning Officer for the purposes of such election. Accordingly, I now issue the following Notice of Election.

Notice of Election

(Given in accordance with the Constitution of NZART)

I hereby call for nominations for the office of President and for the Executive Council of NZART

Nominations are to be addressed to the Returning Officer NZART Headquarters, PO Box 40 525, Upper Hutt 5140 and must be received by me by 31 December 2012

Every nomination shall be in writing and shall be signed by the person nominating and a seconder and shall be countersigned by the member nominated. The nomination should also contain a certificate signed by all three parties, that the candidate is an active amateur.

A member may be nominated for either or both the office of President and Councillor for a District.

In the election for Council only members attached to branches within the electoral district for which the election is being held are entitled to nominate or be nominated for office or vote in any election. To assist me in ensuring full compliance with this requirement, it is requested that the parties involved in any nomination for Council name their respective branches and state their common electoral district as being, either Northern, Central, Midlands or Southern (as the case may be).

It is desirable that Candidates provide me with personal biographical details before 31st Dec 2012 for the inclusion with ballot papers to be posted out in February 2013 (these may be edited where necessary). A passport-type photograph may also be included.

Evan Sayer
Returning Officer

some still photos and audio from ZL2BK. Google: ZL2ASF YouTube, you should see a cream Eddystone receiver, click on that.

Alternatively, type this into your browser: <http://youtu.be/ZGOhvog0jK4>

What happened above 40 metres?

It is likely the spacing of the HVTL and the ground are too large in parts of the transmission line between the two locations. The terrain is rugged and the height above ground of the HVTL could be 200 metres or more in places. A path entirely over flat ground should provide increased signal levels at higher frequencies.

To further our knowledge of the effects around 20 metres, a week later we went to another location close by. The aim was to receive noise from the HVTL and measure noise on vertical and horizontal polarisation.

For this we made a shortened 20 metre dipole with two Hustler resonators and a 1:1 Balun.

The noise was measured with difficulty due to an electric fence pinging the Eddystone receiver meter, which only has a meter scale range of +/- 5 dB, all the rest is done by input attenuators.

Eventually the conclusion was that vertical polarisation was ahead of horizontal polarisation by 10dB parallel to the lines, followed by a very distant horizontal at right angles to the lines.

Strong CW signals were observed on 20 metres also with the same results, proving it works well on 20 metres as an antenna and vertical polarisation of the exciter antenna is still best.

A New Challenge for LF/MF/HF Mobile

It is very likely that the low frequency bands of 137 kHz, 476 kHz and 510 kHz will produce even better results as a "leaky transmission line" with HVTL. It should be more tolerate of uneven terrain.

How far will it go in distance? What is the highest frequency for distance it will support during the day?

There is plenty of scope for experimentation and a lot of fun too. Make a movie clip of your results and post it.

Be sure to let us know how it works out!

Anyone for 137 / 476 / 510 kHz mobile?

Acknowledgements

Many thanks to Grant Simpson ZL2BK, Jim Jackson ZL2BCG and Alexander Fogerty. βi

160 m signal from ZL2BK peaking at S9+42 dB via HVTL.

ZL2BK near Renwick (photo ZL2BK).

Hacking the VK5JST Antenna Analyser

by Robin McNeill ZL4IG

This article describes a voyage of discovery by the author into the world of microprocessors and test instruments with some useful links, findings and explanations that other hams similarly disposed may find useful when embarking on their own adventures.

After years of wishfully contemplating an antenna analyser, I finally found $A 145 for a VK5JST Aerial Analyser kit from the Adelaide Hills Amateur Radio Society (1). This would not be the most straightforward kit I have ever built, requiring a little dexterity with drills, hacksaw and files, and calling on more than the occasional use of grey matter to assemble it. But, at the end of the construction effort I felt I had actually built something, rather than just having rearranged some components. This was very satisfying. The instrument gave results within ± 10% at an SWR of 6 and ± 1% at an SWR of 1 up to 32 MHz, which more than satisfied my requirements and according to ARRL (2) is about as good as it gets. It is not surprising that there are now over 12 000 of James VK5JST/VK5TR's analysers in use around the world.

I had taken some months to decide on which analyser to buy and had settled on the VK5JST because not only was it the cheapest I could find, but other amateurs had written upgrades for its PICAXE microcontroller firmware and in theory it wasn't going to be difficult for me to write my own firmware hacks. Furthermore, if it broke down I should be able to fix it. There is also scope for hardware modifications, though I wasn't contemplating trying them.

Once I had built the kit I found that it was easy to connect it to the serial port of my laptop and so it wasn't long after completing construction that the analyser's firmware had been hacked to display my callsign on start-up. I was confident that this was neither necessary, nor going to improve the functionality of the instrument. However, from figuring out the hack from studying the software and checking the manufacturer's datasheet downloaded from the Internet, I now understood more or less how the industry-standard Hitachi HD44780 LCD display protocol worked and so LCD displays were no longer a complete mystery to me.

Uploading the new firmware had been easy because the PICAXE has a very simple RS-232 interface, comprising just two resistors from the RX and TX pins that make it probably the most straightforward microprocessor in existence to work with. This and its simplicity, I suspect, are the reasons for much of its popularity. Anticipating such interest, the necessary two resistors come with the kit.

As with almost any modern PC, a USB – RS-232 adaptor cable is needed to connect the RS-232 cable to my laptop. I check which port I am using by looking at Start/Devices and then Printers/File/Device Manager/Ports(COM & LPT) when using MS Windows. You need to have the bitrate and data flow settings correctly set: 8N1 (8 data bits, no parity bit and 1 stop bit) is standard and the 28X1 PICAXE with a 16 MHz clock that came in my kit runs at 19 200 bps, which is not what I expected. A word of caution here: when you use an USB – RS-232 adaptor, the PC loses some mildly useful status information.

PICAXEs come loaded with a version of the BASIC (3) programming language that looks little different to what you would have found in the early 1970s. It lends itself to what we used to call 'spaghetti programming', especially as the VK5JST code has eschewed using sub-routines to, I believe, run faster. Things are not helped by PICAXE BASIC limiting you to unimaginative variable names of the form 'b2' (short for 'Byte 2') and integer arithmetic. On the other hand, Revolution Education (4), who make the PICAXE, provide excellent manuals that are easy to read and, like the PICAXE Programming Editor used to write and upload the code to the PICAXE, can be downloaded at no cost. It doesn't take long to figure it all out and the average ham should be able to quickly get up to speed.

The Adelaide Hills Amateur Radio Society website pointed me to Jeff ZL1BIV for the PICAXE code needed to enable the analyser to upload measurement data to a PC and so I duly contacted him: it turns out that the TX/RX pins for uploading firmware can also be used for "talking" to the PICAXE. Jeff kindly emailed me his code that he said was now obsolete and gave me some pointers. As I noted above, the PICAXE is very simple to communicate with and it didn't take long to figure out some further hacks by carefully studying the existing code. Shortly my analyser was able to send a constant stream of comma-separated variable (CSV) format data to my PC. They could be cut easily and pasted into MS Excel to make graphs. Of course, I needed a terminal emulator for my PC to receive the data. On Jeff's recommendation I found that Termite (5) was as good as any other terminal emulator and it's free.

Jeff's code also had implemented the changes needed to convert the antenna analyser into an inductance and capacitance meter by checking the status of an existing resolution mode-switch at start-up. The VK5JST analyser, like most others of its class, isn't actually able to measure the sign of any reactance, so you do have to decide if you are measuring a capacitor or an inductor yourself; there are some things you can't fix with software. The measurements seem pretty accurate and at any rate are good enough for me.

Soon it irked me that I couldn't graph results in real time for I felt that it would be useful to plot results on the fly to give me a better feel for my antennas. Achieving this is not straightforward as I soon found out, as without some help from an Active-X control, which resides deep inside MS Windows, MS Excel won't talk to the real world in real time. There are a number of costly solutions to enable this, but eventually the Web yielded the freeware PLX-DAQ serial communications Active-X control (6), which allows up to 20 columns and an unlimited number of rows of data to be imported in real time. The Active-X control is accessed through a Visual Basic macro in MS Excel,

Figure 1: Photo of the ZL4IG version of the VK5JST antenna analyser on start-up.

which displays a control window on the spreadsheet and is straightforward to use. It is also painless to install.

There was a caveat in the PLX-DAQ ReadMe that I didn't quite understand, so an email to Martin Hebel of SelmaWare Solutions® who, I found, is also a university professor who coincidently sometimes teaches antenna theory, clarified that I was allowed to share my tinkering with the Visual Basic interface as long as any resulting code was named in a way to avoid confusion.

If I criticise PICAXE BASIC for encouraging spaghetti programming, then surely Visual Basic for Applications (VBA) that resides hidden in the back of every MS Office application (look under View/Macros in MS Excel to find it) is best described as delivering 'macaroni programming', for this seems to me to be the best way to describe object orientated language. The irony of juxtaposing stone-age PICAXE BASIC with 21st Century object orientated VBA wasn't wasted on me. Once you get used to the concept of object orientated language, you can sort of work out how VBA works by looking at existing code and if you get stuck there is any amount of assistance that can be found by resorting to Google searches. An introductory book from the library may be better still.

I hacked the MS Excel macros to read the mode settings of the analyser to automatically build correctly labelled graphs and plot the results in real time. Some more tinkering with the PICAXE code was needed

New Members

Name	*City/Town*	*Branch*	*Call-sign*
MA Winsor	RD 2 Ruawai	28	ZL1ULG
A Schutte	Waiuku	10	ZL1ASC
L Gaudin	Christchurch	5	ZL3OM
C Wills	Feilding	20	ZL2CEW
S Tooley	Palmerston North	20	ZL2SCT
IDG Graham	Devonport Auckland	29	ZL1IDG
S Baines	Wahroonga, NSW, Australia	96	VK2BB
J Quedley	Auckland	2	ZL1TNY
J Randall	Waikanae	16	ZL2AZZ
S Lee	Masterton	46	ZL2KE
A D Wallace	Katikati	51	ZL1AYH
M Wooding	Blenheim	22	ZL2MGW
D Clode	Blenheim	22	ZL2TCO
S Jackson	Wellington	18	ZL2YSL
CDK McCormaick	Napier	13	ZL2CDK
AR Scott	Ohaupo	12	ZL1TJT
JE Sands	Kumeu	2	ZL1TEX
DC Maindonald	Waiake	29	ZL1BTY
DG Hasler	Gore	8	ZL4IX
EG Scudamore	Dunedin	30	ZL4AH
G Tunnicliffe	Te Atatu	2	ZL1BLZ
AJS O'Grady	Te Aro, Wellington	50	ZL1MYF
DV Vandenberg	Tauranga	88	ZL1DFV
RA Hislop	Tauranga	88	ZL1ROS
WL Davis	Auckland	2	ZL1TDE
BH Appleyard	Greytown	46	ZL2PM
BM White	Hamilton	83	ZL1BIW
F W Lusty	Waitara	47	ZL2APF
PO Schulz	Whangarei	28	ZL1TXP
SG Mangin	Greytown	46	ZL2BLQ
PN Brown	Balclutha	30	ZL4PB
LJ Keeley	Ashburton	1	ZL3AJA
JP Godfrey	Auckland	3	ZL1TFC
JK Dougan	Auckland	2	ZL1JKD
AR Johnstone	Lower Hutt	18	ZL1RZ
K McRoberts	Nelson	26	ZL2TLM
P E Carpenter	Kerikeri	78	ZL1PEC
P E Pert	Hamilton	81	ZL2AI
R C Krautz	Rangiora	68	ZL3RCK
P A L Scott	Tauranga	39	ZL2TVO
D I McBride	Dunedin	30	ZL1AXIE
D O Candy	Taihape	60	ZL2TFY
D W Bloom	Whangarei	28	ZL1DWB

so that the two devices could 'talk' to each other to manage this. If anyone is interested, I can email both the resulting PICAXE code and Excel workbook on request (7). Be warned that my code is not perfect, though it is reasonably well documented; however, I have got to the point where I want to use the analyser, not continually fine tune it.

My renewed interest in microcontrollers by now was piqued: although it was functional and easy to use, indeed, if pressed I could live with it. I felt that my future wasn't with PICAXE BASIC: a whole new world awaited me, if only I could find it. Trawling through the Web, I found Texas Instruments' MSP430 LaunchPad (8), which Texas Instruments will FedEx to your backdoor for just $US4.30 (don't you like it?!) all up once you supply your credit card details and promise not to use it to make a guided missile. Unless you can code in C/C+ and know how to deal with interrupts, flags, bit addressing and nitty gritty, expect a steep learning curve. It is in my future, but I don't expect any useful results anytime soon.

My attention moved to the VK5JST analyser measurement hardware. Using non-linear OA45 germanium diodes to rectify RF measurement voltages which are then linearised with an op-amp is okay, but these days there are some really impressive, high accuracy, linear RF voltage and power measuring chips from Analog Devices (9) that should do a much better job without costing an arm and a leg. A colour LCD graphing screen would be nice, too. The more I thought about it, the more digital techniques seemed to be where amateur radio is now at, to the point that I felt it was time to warm up the filaments in my old 1962 Hallicrafters SR-150 and have a CW, the ultimate digital mode, QSO at the bottom of 40 m, because, let's face it, with old valve rigs and their wide range Pi-network outputs, who cares what the SWR is anyway? βi

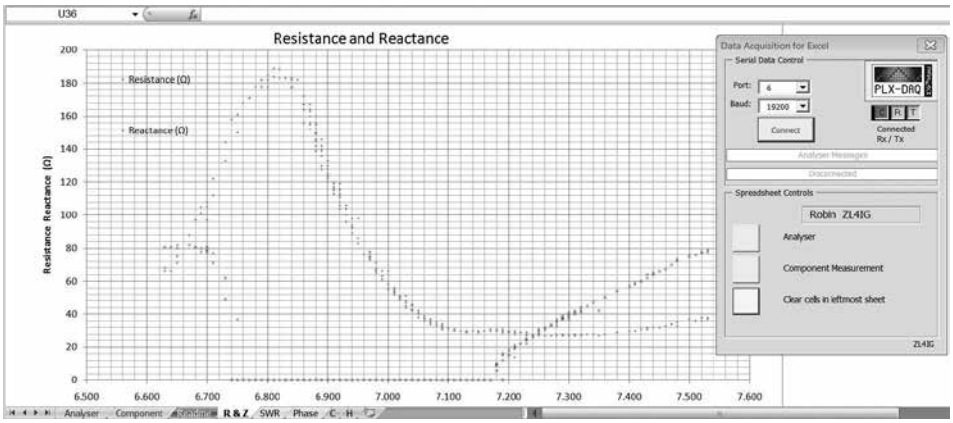


Figure 2: Screen shot of MS Excel and PLX-DAQ serial communications, Active-X control screens measuring the SWR of the author's 80m/40m homebrew trap dipole.

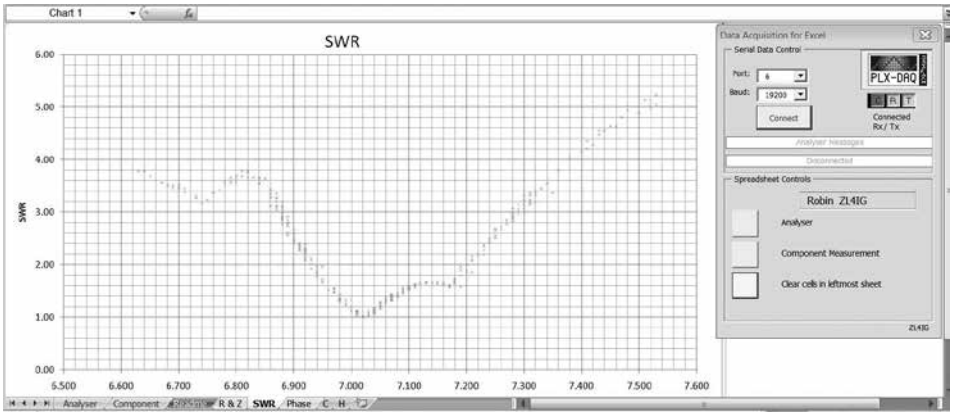


Figure 3: Screen shot of MS Excel and PLX-DAQ serial communications Active-X control screens measuring the reactance and resistance of the author's 80m/40m homebrew trap dipole.

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(6) <http://www.parallax.com/tabid/393/Default.aspx/>
(7) <r.mcneill@ieee.org>
(8) <http://www.ti.com/tool/msp-exp430g2#1/>
(9) <http://www.analog.com/>

Amateur Radio Memoirs

by Clif Reed K6DO ex-ZL2AHV, ZL1AR, ZL1BR

(Clif Reed, former Director of Trans World Communications, is currently writing his memoirs and has kindly sent Break-In this chapter covering his amateur radio activities. Editor.)

My interest in amateur radio led to communications and my decision to make a career in this field. As a small boy I was always interested in technology and having tried such pastimes as model aircraft building, chemical experiments with a leaning towards explosives, I became interested in electricity. From batteries and lighting circuits I progressed to crystal sets and then my first vacuum tube regenerative receiver (The Hiker's One).

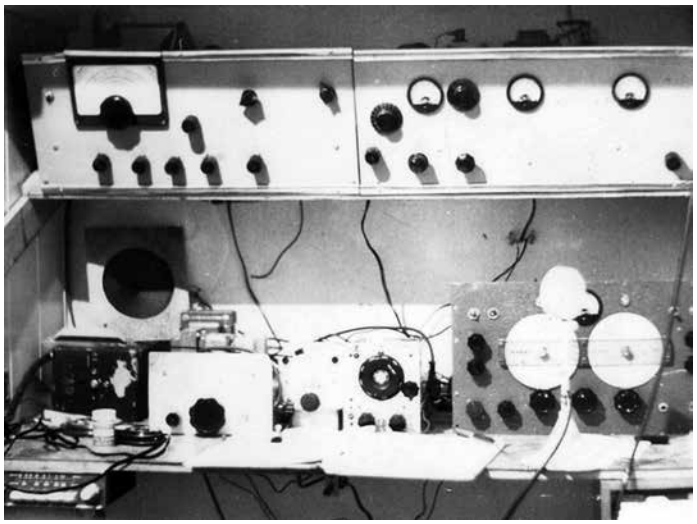
Our next door neighbor was Ralph Slade ZL2BK who was head of Philips Electronics in New Zealand during World War II and was involved with the ZC1 military transceivers produced in New Zealand. Ralph was one of early pioneer of electronics in New Zealand and participated in the very first transcontinental radio contacts. After the war Ralph became active on 40 m with a much modified ZC1 and this spurred my initial interest in ham radio.

The ZC1 transceiver was sold on the surplus market after the war and was widely used by NZ amateurs. I remember working after school during the vacations and after about 18 months I was able raise £20, a substantial sum in those days. I think this was the most exciting purchase I have ever made in my life. I soon had the transceiver operating on AC power and incorporated many modifications for amateur use.

The minimum age for an amateur license was 15 and I sat the examination as soon as possible. In 1948 I received the call-sign ZL2AHV. I was very active on the air but even more interested in experimenting. There was no commercial equipment available and you had no choice but to build your own. I had read the early articles in QST about SSB and was very interested. It did not seem practical to get the parts required to build a SSB exciter so I added SSB to my wish list. At that time Ralph Slade was running EDAC, a Philips subsidiary involved in industrial electronics. Ralph had commissioned a series of design and construction articles in a magazine called *Radio & Electronics* and one of the projects was a SSB exciter. Ralph had the original proto-type and he passed it on to me. It was a phasing rig using four large pentodes in quadrature as a balanced modulator. I played around with it and as there was no activity on SSB put it away on a shelf. One day a friend asked me about it and I fired it up on 75 m and called CQ. To my astonishment I received a call from Bronc ZL2ATX one of the early pioneers on SSB. I had had so little experience with SSB I had considerable difficulty tuning his signal.

My next contact was with Lester Earnshaw ZL1AAX in Warkworth and we had a small group of SSB enthusiasts who talked together most evenings. Most of were using phasing type exciters similar in design to the early Central Electronics equipment. We were joined on AM by Dennis Cobbe ZL1ND of Rotorua who was initially rather skeptical of the new fangled mode. It was not long before he joined us with a new rig of his own design. Subsequently I met with Lester and Dennis and became close friends. Our paths crossed later when the three of us emigrated to the USA.

I started my career in the family publishing business but I did not inherit any of the family's literary proclivities and decided that I had better try and make a career in electronics. I moved to Auckland and joined Automatic Telephone & Electric Company, an old British telephone company who had just purchased a small radio telephone manufacturer. Subsequently they were purchased by the Plessey, a large British electronics company. In the early 60s I was transferred to Plessey's International Group in London. I held the call-sign ZL1AR while I was in Auckland but my amateur activity was quite limited. I did do one small service to the amateur community by arranging for Plessey to give their stock of a superseded VHF radio telephones to NZART for emergency communications.



Early station in Kelburn.

Clif operating an emergency station in Wellington.

I did not have any opportunities for amateur activities while working with Plessey in the International Group. Although I enjoyed my time with Plessey prospects for the future did not look great. After my marriage we decided to go to Canada where I joined Philip's Electronics as Telecommunications Manager. I did get a Canadian call-sign VE3BTD but was never active there. Lester Earnshaw was then living in the US working as a consultant. I discussed the Canadian distribution of a SSB transceiver he had designed for a company in Kansas City. He visited me in Toronto and there we discussed the idea of forming a new company to manufacture SSB equipment. Early in 1967 I joined Lester in Escondido, California where we started Southcom International.

In 1970 I left Lester to form my own company, Trans World Communications. We manufactured a range of radio communications products, first for commercial use and SSB radios and my ham radio experience was invaluable in running the company. I was always very active in engineering and was responsible for the design of many of our most important radios.

I had little time for amateur radio but did get back some interest when I went to a ham convention in Los

Angeles and won the door prize; a Hallicrafter Transceiver with a built-in 1kW final. I made a few contacts as VE3BTD/W6. When my Canadian license expired that came to an end as resident aliens could not hold a US amateur license. After I became a US citizen I obtained my Extra Class License and was able to get my call-sign K6DO in 1971.

Although my business career left little time for amateur radio I did have several opportunities to use my amateur license to demonstrate our equipment. On one occasion I was in Spain running demonstrations for the military in the Pyrenees Mountains. All the officers wanted to go off for the field tests and there was no one left to operate the base station. There were several amateurs in the group so I was left to operate the base as K6DO/EA and we ran successful trials. I had similar experiences in Africa, South America and often in the US. At one stage we manufactured an aircraft SSB radio. This was not a very successful product but was a good excuse for me to own a company aircraft and I made many QSOs operating aeronautical mobile.

After I retired my wife and I spent the best part of two years sailing around the Pacific in our 50ft sloop and I made good use of amateur radio to keep in contact with the USA and with other sailboats cruising the Pacific. I had daily contacts with Dennis Cobbe, ex ZL1ND, now KI6TN. We used our S3M selective calling system, designed by Dennis, so we did not have to keep any special schedule and I do not remember missing a contact all the way down to New Zealand. Many cruising sail boats use amateur radio and as a volunteer examiner we conducted examinations in Mexico and New Zealand resulting in upwards of fifty new licenses or upgrades.

After our ocean cruising we bought a large power boat and it was well equipped for amateur activity. We first cruised Mexico during the winter months and operated K6DO/XE. Later on I took the boat to New Zealand where we built a home on the Whangaparoa Peninsula north of Auckland. I renewed my ZL license and received the call-sign ZL1BR. We spent our US winters in New Zealand for several years and I was an active member of the Hibiscus Coast Radio Club. We eventually found the commute each winter too much and sold the house and boat.

We now live in a high rise in Dallas, Texas now and my activity is restricted to a MFJ loop out on the balcony. We do have a summer home on a lake in Ozarks in Arkansas but this is a gated community and does not permit antennas. Recently I purchased an Icom 7800 and installed a dipole for 7MHz and a fixed Steppir® 2 element beam for 20 to 50 MHz in the attic. It is surprising how well they perform and I have been able to make contacts all around the world.

I own the original prototype of my company's first kilowatt solid state amplifier, designed by Dennis Cobbe ZL1ND/K6DO. It still puts out an easy kilowatt after more than thirty years. Occasionally I fire up the prototype of the last transceiver that I designed, the PRC1099 a military SSB packset. I was interested to see that this model is still in production after nearly twenty-five years although I am sure they have updated much of the circuitry. Recently I have been interested in the new digital modes and have been fascinated by good results obtained with low power and simple antennas. βi

Station ZL1BR in Auckland.

Auckland station ZL1AR.

T1000; the world's first commercial 1K.

My station K6DO in Arkansas.

Navigation station in Shannon Star.

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Tony's Maritime Net

by Patricia M Dallas ZL2RK

Any amateur who has been cruising in the Pacific Islands is familiar with Tony's Maritime Net on 14.315 MHz at 2100 UTC. But how many realise how long it has been operating? Several current members, including Tony himself, gathered with other hams in August to farewell the current net controller Fin Bruce ZL4HI. Some of us more recent cruisers were amazed to learn that the net has been in operation since the 70's. It sort of started, well the idea anyway, in 1975 when Tony ZL1ATE was listening to an American cruiser in New Caledonia talking to a cruising doctor near Hawaii. They needed help communicating and Tony stepped into relay instructions on how to deal with a coral cut that had gone septic. The cruiser managed to sail to Auckland and was met at the wharf by a New Zealand doctor and an ambulance.

Cruising in those days was a very different scene than what we have today. Communications lacked cell phones, satellite phones and *PACTOR* modems linked to computers which enable email and downloading of weather information. Clearly there was a need for a more organised form of radio communication and so the idea of a net for the South Pacific was formed. Many will remember the cheery voice of Robbie, now VK4YV who ran the Pacific American Net in the 70's, initially from Samoa. He had such a strong signal on 20 m that when he moved to Vanuatu he had to close down at 6 pm so that locals could hear the news without interference!

Tony's Net first started on 80 m and mostly dealt with boats in New Zealand's Bay of Islands. At this time Tony was living at Waihi Beach. Colin Busch ZL1BKD, QTH Kawakawa, was a very popular net relay station as he would often meet a boat at the Opua wharf with a crate of milk. Another interesting net relay was Terry Small ZL1MA, who was blind but never made a mistake reporting a position or giving a weather relay. Tony cannot remember when he moved the net to 20 m, probably in the mid to late 70',s and propagation was so good in those days that 5x9 signals from throughout the Pacific were the norm. Many of the amateurs had rather suspect call-signs from Panama and Mexico; including the sailor with the coral cut mentioned above. All were welcomed aboard until such time as it became possible to check call-signs and this meant many Americans and Canadians dropped off the radar until an American trio with Extra licences held a training course and exams for the US licence! Around this time between 12 and 20 cruising amateurs made the net a busy place to be each morning.

Tony was also one of two New Zealand net controllers for the Pacific Seafarers' Net which was started in the mid-70s on 14313 at 0330 UTC. It was modelled on the North Pacific Net and continues to be a very popular net, mainly used by folk crossing the Pacific. Now on 14.300 MHz it is more formal with detailed position reporting and these positions and weather information are now logged onto an internet site so that friends and family on land can keep track of progress.

Fin ZL4HI, a long term amateur was based in Dunedin in the late 80s. He had a small boat and Tony survived a trip out on the not placid Dunedin waters during a visit to the South Island. They must have talked about the net and soon Fin was a regular relay station and a daily one when he retired to Kamo. During WW2 he had been a communications serviceman for the Air Force in Suva so was not only an experienced operator but a very organised one. The net needed a good man for detail and he took responsibility for logging the detail of boats and crew and daily positions. Late one night, while in Dunedin, he was tuning around demonstrating the radio to a visitor when he heard a boat calling a 'Mayday'. The signal was very weak but he managed to get all the detail and alert authorities who arranged for the family of four to be picked up by a nearby vessel. They were very lucky, especially as they were delivered to friendly Norfolk Is. On their trip from Australia back to New Zealand they had hit a whale calf. Its mother, whether by accident or design, decided to smash her tail into the sailboat and it quickly sank. The family got into the life raft along with the radio. Fortunately the daughter had grabbed a few clothes (well it would be the daughter wouldn't it!) including the hangers. Dad made an aerial from these wire hangers and that enabled the very weak signal to be heard by Fin in Dunedin. The experience did not put the family off cruising as not much later Tony saw a bigger boat being built in a shed at Penrose! And a few years later the daughter also took her family cruising.

The Net has been able to assist a number of yachts over the years in emergency situations, in some cases coordinating with navy and air force to effect a rescue. Dr John ZL1AZR, was always available for helping with medical advice. Daily weather exchange helped the yachts plan their voyages and avoid severe conditions. This was one of the Net activities that led a group of hams in Australia to take legal action! This group maintained that weather and position reporting should be the role of Commercial/Coastal stations. They took their case to the Australian Dept of Communications for a verdict. Over 100 yachts and many others supported the Net operations and common sense prevailed. John VK9JA recalls that in these days determining weather required a good couple of hours deciphering Morse and fleet code so it is no wonder that boats appreciated his efforts.

Fin had many talents and interests. As a keen photographer he captured many of the happy faces at what used to be the annual Tony's Net Picnic in the Bay of Islands. These were a popular gathering for cruising hams and the land station operators. Harry and Marge on Whalesong organised several but the most memorable was organised by Dick ZL2YLX and Babbie ZL1USA. They are both accomplished divers and arrived with a collection of over 30 live crayfish! Now a relay station in Nelson, they still go diving but the crayfish are not so numerous! Fortunately they have kept Fin's record of all those

Members of Tony's Net taken at the funeral of ZL4HI. Centre is Tony ZL1ATE with XYL Margaret. Clockwise is Dick ZL2YLX and Babbie ZL1USA, originally cruisers famous for bringing crayfish to picnics, now resident in Nelson. Patricia ZL2RK the author and David ZL2VY are still cruisers but now have a land QTH with a coast station licence at Gulf Harbour. At back left is John ZL1AQS who has ensured the signal from Tony's new QTH is heard again in the region.

Well known net identities taken at the April 1997 picnic in Opua. Tony Babich ZL1ATE, Dick Joyce ZL2YLX, Arnold Gibbons ZL1DB, Dr John Rea ZL1AZR, Colin Busch ZL1BKD, and Fin Bruce ZL4HI. Babbie Joyce ZL1USA can just be seen on the far right.

who attended these picnics and a read brings back many memories.

Tony and Margaret moved to Auckland in 2002 where heavy duty power lines made receiving a lot more difficult. Then a gale blew the antenna off the mag-mount on the roof and dropped it on the clothesline. Amazingly it still worked on 2 m and he was able to call Fin ZL4HI and ask him to take over the net. And so continued Fin's approximately 25 years as net controller. Strangely it was the use of the Klondike relay that enabled this contact. As a member of the Manukau Radio Club Tony had helped put up the tower at Klondike; almost 50 years ago! By this time Fin and his wife Tam had moved to Hamilton, leaving behind a lasting collection at what is now called the M Madden Fern House in Whangarei.

As acting net controller Fin became a familiar voice to boats in the South Pacific each morning at 2100 UTC. Along with the relay stations on the east coast of Australia, and Tasmania, as well as the land stations scattered throughout New Zealand, the net managed to keep track of boats wherever they were. And as one of those boats for the last 15 years this writer knows how comforting it can be to know that someone is out there who sounds familiar. For Fin it was the start of quite a busy day. He and his family are all very musical and he had played the bagpipes since his early childhood. He continued to play the pipes in local bands and for Scottish country dancing events. His botany interest transferred to his vegetable garden so he was very active outside the radio shack.

Tony has recently returned to the net as he has moved to a much better location in south Auckland. (This was just a week before Fin passed away). He reckons his Kenwood 930 has become even heavier so it is unlikely to be moved again! His shack is now a very comfortable lined and carpeted shed on the property and he is enjoying being back on the air, thanks to antenna maintenance from John ZL1AQS. The net is again being managed from Waihi Beach, this time by ZL3DM. Dave has been a very strong net relay station for many years and has a great signal from his log periodic beam. Like most net relays he has come from the sea having been an engineer on coastal and ocean freighters.

The main goals of the net continue to be facilitating communications between maritime stations and land. For the most part this is a daily chit-chat, and speaking from the boaters' perspective it is a very pleasant way of keeping in touch with home. It is now very much an Australasian Net. The familiar voices are much appreciated particularly when you are in boisterous conditions on a passage. And it is always nice to describe a beautiful anchorage when you have heard about the frost in Hamilton! However there are the infrequent times when the net provides help of one form or another – often related to weather. In years gone by Arnold ZL1DB would assist from Raratonga, and John VK9JA from Norfolk Island often gave reports from that area and gave advice on where would be best to anchor. Dick VK9LH further south at Lord Howe Island covered that area. In Suva, Asea 3D2AA would report on local conditions but sadly passed away last year. To show how conditions have deteriorated, Dan VK4DFT, used to contact the net with 100 W when in the Med during 89-91! These days it is sometimes not easy to get a good signal from the boats but with the strong relay stations in Australia and New Zealand you can usually pick up a position report. Current relays assisting Dave ZL3DM on the 20 m net include, Bob VK4WRB, Gary VK4IBC, Dan VK4DFT, John VK-4BJN, John VK7ZZ, George VK2CTI, Trevor ZL2GD, Dick ZL2YLX, Bob Zl2AIA, Reg ZL1RC, and cruisers Ashley VK4FUU, Christian ZL1DIY, and Patricia ZL2RK.

Fin will be sadly missed but Tony can look back on what he started many years ago and be well satisfied that the net will continue well into the future.

The author would like to thank all those who have contributed to this history; especially ZL1ATE, VK9JA, and ZL1USA. βi

Awards

Awards Manager: Alan Chapman ZL3GX
<awards@nzart.org.nz>

By the time you are reading this column we will have returned from a 16 day tour of India. Just before *Call Book* deadline and after *Break-In* deadline I had notification that the Rhododendron Award has been deleted. This is yet another short term annual award to disappear.

Once again the popular Kordia National System Award is running.

I would like to wish you a Merry Christmas and a Happy New Year and hope Santa brings you that new rig that you always wanted.

Kordia National System Award 2013 Cities, Suburbs and Towns.

A fun event, for all Amateurs. All who submit a log will receive a Certificate.

Starts: Tuesday 1 January 2013; closes: midnight Sunday 3 February 2013.

The *BIG* challenge, how many cities, suburbs and towns can you contact ?

Simple rules

- Contact an Amateur in any City via the National System; both sender and receiver log 1 point.
- Contact an Amateur in any Suburb of any City via the National System; both sender and receiver log 1 point.
- Contact an Amateur in any Town via the National System; both sender and receiver log 1 point.
- Contact a National System Trustee, (refer to *Call Book* Page 7-4 for a list), log five Bonus Points.
- Cities, Suburbs and Towns may be logged only once. "Town" means any named community.
- Logs must be in the hands of the Custodian no later than 28 February 2013, and may be submitted either attached to an e-mail to <zl2wa@clear.net.nz> with KNSA 2013 in the subject line, or post to;-
  Kordia National System Award
  Wellington VHF Group Inc.
  PO Box 12 259
  Thorndon
  Wellington 6144

Copies of the Promotion and Log forms are available in PDF format, from the website at <www.vhf.org.nz> or from the Award Custodian, via e-mail <zl2tgq@paradise.net.nz>

The Kordia National Systems Awards 2013 is proudly presented by Wellington VHF Group Inc for the enjoyment of all Amateurs, to emphasize the coverage of the National System, and to recognise the contribution to Amateur radio made by Kordia.

Club Awards

Clubs running short-term awards or new awards should send details of the award to me via email or at my *Call Book* address or the address below. Remember that *Break-In* is only published on even months and copy, including, if possible, a copy of the certificate, for inclusion, should reach me by the end of the even month.

The Awards Net runs on 80 m, 3.677 MHz every night from 0800 UTC every night of the year. Every one is welcome to join in especially if you are mobile and in a rare county or district.

NZART Awards Manager, PO Box 1733, Christchurch 8140, <awards@nzart.org.nz >, <www.nzart.org.nz/activities/awards/>

The Morseman

Gary Bold ZL1AN
<morseman@nzart.org.nz>

The Picaxe Keyer

In 2004, one of my graduate students needed a simple, battery-powered square-wave generator to calibrate an amplifier system. A search turned up the Picaxe 08 chip, a cheap, locally-obtainable 8-pin micro-controller, with an on-board interpreter for a simple dialect of BASIC. Furthermore, it came with free programming software[1] which ran on a PC, downloading code to the chip with a very simple interface.

The calibrator code was so trivial to write that I figured that the chip could also implement an iambic keyer. I'd already written BASIC keyer code for a Commodore 64, and we re-wrote it for the Picaxe in a couple of hours. This also worked, but with one drawback. BASIC interpreters are a couple of orders of magnitude slower than compiled code, and this chip, running with a clock-speed of 4 MHz wasn't quite fast enough, and this introduced slight timing glitches above about 15 wpm. But prior to this, all keyer chips I knew of had been programmed in assembly language, and BASIC is much easier to learn. I wrote about this in my May-June 2004 column, and for some years had a document describing it on my website. I took it down when Bryan ZL1NI, produced the Atmel-based ATTiny25 keyer, programmed in assembler language. This runs much faster, and is totally glitch-free. Bryan still provides it at cost plus postage. Email me if you want his address.

A Better Picaxe Keyer

Then, a couple of months back, Steve, VK6HV contacted me for permission to enhance my old Picaxe code using the latest 14M2 chip. Of course, I said 'yes', and Steve sent me a PCB with programmed chip and all components installed for evaluation. I saw that these chips have developed considerably since I programmed mine! This one one has an enhanced instruction set, runs at 32 MHz, and allows about 600 lines of BASIC code instead of 80. The schematic is shown in figure 1. I immediately fired it up and had a QSO with Chris ZL1CDP at 25 wpm, and found that all the timing glitches had gone. It sounded just like my CMOS Superkeyer.

The "speed" pot varies the sending speed between about 5 and 38 wpm, and two alternate keying circuits are provided, one for standard "positive line" keying with a FET, the other using a reed relay to key anything at all, perhaps a code practice oscillator, or an older valve rig with negative line keying. Steve's software can implement either type A or type B keyer logic, bug mode (user-controlled dashes), random character practice mode, and has an audio monitor implemented in software, with tone control! Like all Picaxe chips, it's programmed with a three-conductor serial programming cable, connected to pins 2 and 13. There's a regulated power supply on the PCB too, which I haven't shown.

Auto-space keying

But Steve hadn't implemented one feature which my fingers have been conditioned to expect for many years; the "auto-space" algorithm. This first appeared in the hardware of the Accukeyer, designed in 1973 by James Garrett WB4VVF[2]. With practice, autospace makes it impossible to run characters together, and so send perfect code. I suggested that Steve include this as well, and in a couple of hours, after examining my original code, he'd figured it out and emailed the result.

The algorithm is very easy to implement. My original code, in Piacaxe BASIC, just says this:

```
if ditcontact  = 0 then dit
if dahcontact = 0 then dah
gosub ditwait
gosub ditwait
goto loop
```

The program comes here after sending a code element and its following ditspace. If either dit or dah contacts are currently closed, the corresponding element sending subroutine is called. These subroutines both check to see whether the opposite contact is also closed, in which case the opposite, iambic element is sent. If neither contact is

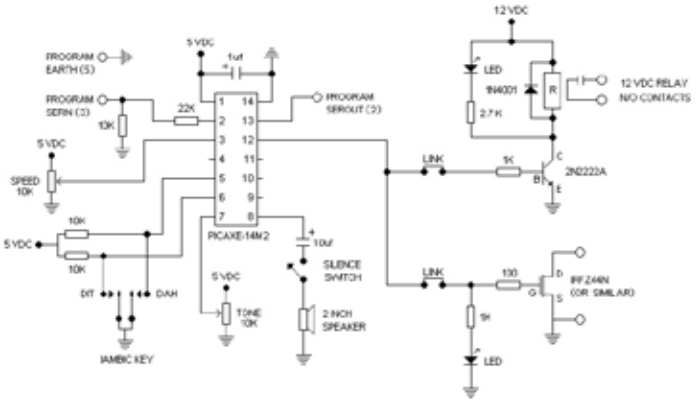


Figure 1: The Picaxe keyer of Steve, VK6HV.

closed, a delay of two dit periods is forced, which adds to the terminating dit period already sent as part of the preceding element – thus, forming a correct character space.

In practice, this has two consequences: Firstly, you have to start the next element during the preceding ditspace, or you'll get a wordspace you didn't want in the middle of a character. This is good, because after you're used to it, this eliminates any slightly long spaces between elements which leave the receiving operator wondering "was that one character or two?" Secondly, you're forced to leave a correct character space following a completed one, because the keyer won't let you start early.

Most keyers now include autospace as an option, but many operators try it, then disable it again, because they find it "upsets the rhythm of their sending". I must insist that if this is the case, your code is coming out with one or both of the faults above, and you're sending bad code. One operator I corresponded with years ago said that he'd switched on autospace after I'd advocated it in an earlier column, but then found that his keyer "seemed to have a mind of its own". However, he persevered, and after getting the hang of it, admitted later that to his surprise "his CQ hit rate had gone up substantially".

Steve's web-page[3] gives code segments that you can download as text files, and use to program your own Picaxe keyer. He also gives PCB layouts, and suggests how to make them. Even if you don't want to do this, it's interesting to see just how keyer code is constructed. You'll see that the code is easy to modify or enchance to your preference – such as changing the speed range.

An early telegraph pioneer

Herman, VK2IXV, has sent the background of a rare key in his

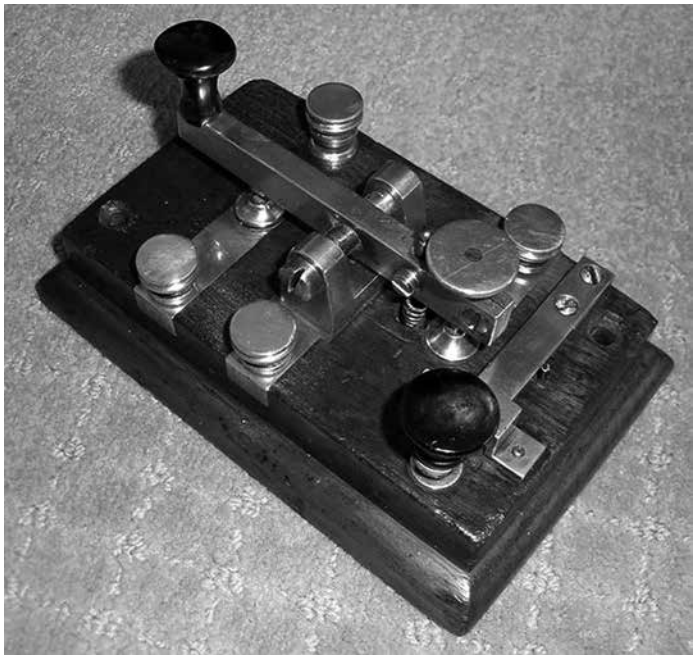


Figure 2: The Breguet key acquired by Herman, VK2IXV.

collection:

"In August 2012 I acquired a French telegraph key made circa 1850 by Louis Francois Clement Breguet, in France. This key, shown in figure 2. is unusual in that a small key, on the same base as the main key, was used by the Operator to activate a bell in an adjacent room to alert the messenger boys that incoming telegrams were ready to be picked up for delivery.

I was told by the renowned Belgian telegraph instrument collector and Breguet expert Fons Vanden Berghen, who lives in Halle Belgium, that there are only a small number of Breguet Morse keys still in existence. The logo of the key's maker, "Maison Breguet Paris" and the numbers 80887 are engraved into the bottom of its mahogany wooden base, which stands on a square wooden mahogany frame.

"Maison Breguet (The House of Breguet), was founded by Master Watchmaker Abraham Breguet in Paris in 1775. His grandson, Louis Breguet (1804-1883), was a physicist and watchmaker, noted for his work in the early days of telegraphy.

In 1833 Louis became director of the Breguet Company, when his father Antoine Breguet retired. Under Louis' management the Breguet Company not only developed and manufactured timepieces, but also telegraph keys, electric-magnetic dial (ABC) telegraphs, astronomical telescopes, marine chronometers, lightning arrestors and other scientific instruments.

"In 1870 Louis decided to devote his attention solely to the emerging field of telecommunications and the making of electrical telegraphy apparatus. The watchmaking business was handed over to his factory manager Edward Brown, who eventually became its owner. In 1970 the Brown family sold to the Chaumet Bros. Paris. When they went bankrupt in 1987, they sold to the international investment corporation Investcorp, which sold in 1999 to the Swiss Swatch Group.

"Through all those changes, the name of Breguet lived on and Breguet luxury watches can still be purchased. Only a few Louis Breguet telegraph instruments are displayed in the National Conservatory of Arts and Crafts in Paris, the majority being held in reserve. By far the largest number of Breguet telegraphic instruments are in showcases inside the home of Fons van den Berghen, where admission is by invitation only."

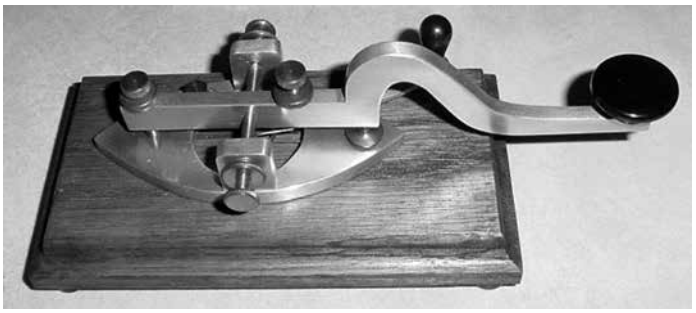


Figure 3: The Phelps camelback key.

The Camelback key

Telegraph keys of curious design began to appear in the late 1840s in the USA. They became known as "Camelbacks" because all displayed a hump in the lever, usually in front of the pivot, often quite pronounced. Their shapes varied widely, and many examples are shown on the web[4]. Figure 3 shows a typical example, produced by George Phelps around 1860, widely used in the American Civil War.

I have long pondered the reason for this eccentric hump. Had it to do with the "operating feel" of the key, a re-distribution of mass affecting the lever's moment of inertia? Simple physics shows that this can't be the case, since the arm's moment of inertia is a function only of the distribution of mass with radial distance from the pivot, and a thickened, straight arm would give exactly the same effect.

Was it, then, just an aesthetic enhancement? Certainly, some operators feel that this is a "pleasing" design, and plans are available for constructing your own. I consulted several knowledgeable key collectors and historians, for their thoughts on these different points of view.

Tom W1TP, said that "these are questions that many of us have struggled with", but had no personal opinion. Roger Reinke quoted observations made in a Telegraph manual of 1859 which infers that weight distribution was thought important, but didn't have a firm opinion either. Herman VK2IXV agreed with this early "weight distribution" theory (even though it's invalid on physical principles), but observed that "later, the camelback shape was retained because it's pleasing to the eye". John W2NI had no opinon on what, if any, physics might have influenced the design, but said that that Phelps was a skilled machinist, not a telegrapher, who was probably influenced more by artistic considerations.

Thus, the experts left me little wiser. But since none of them could point to any perceived mechanical or operating advantage of the design, I'll come down on the "aesthetic" side. They made these keys just because they "looked good".

Last month's problem

See figure 4(a). This configuration is generally called a "*Vbe* multiplier", or "*nVbe* circuit", and the one illustrated is used to bias the output stage of the LM741 integrated op-amp, see the schematic[5]. It was correctly identified by Ross ZL3TFK, and Basil ZL1TOW, who said

"This is essentially a zener diode replacement. Assuming *Vbe* = 0.7V,

*Vce = 0.7 * (4.5+7.5) / 7.5V = 1.12V*

"In the LM741, this circuit develops this constant voltage between the bases of the complimentary emitter follower output stage, so that the LM741 acts as a linear amplifier, without both output transistors conducting simultaneously, because the voltage is less than *2 * Vbe*.

"As this transistor is adjacent to the output devices, the *Vce* voltage will also track the thermal changes in *Vbe* of the output transistors. Zener diodes require tricky doping to set their voltage in fabricating chips, a transistor and a couple of resistors is easier."

Ron ZL1AI, sent me an article he'd written for the journal "*73*" in 1970, which used a similar circuit to bias a tube amplifier.

Gary ZL2TBH went further, sending a detailed critique of this simple circuit and giving a better, modified version which includes a Miller-effect capacitor between base and collector to give a "soft start", a collector resistor to smooth out variations of supply current, and a trim-pot to adjust the voltage. Alas, there's no room for it. If you want his full account, email me.

A useful reference

Re the previous month's problem, the transistor input stage with unbypassed emitter resistor, having base biased from the collector. I had thought that I invented this, since I have never seen it anywhere else. But John ZL2AST, pointed me to an e-book in which it also appears; but only once, and with no analysis. This on-line book[6] is a most useful reference, which I had never come across before either. It starts from first principles, explaining the resistor colour code, how to check transistors, then gives many example circuits of increasing complexity.

There's a link to a companion book "*100 IC Circuits*", with many more useful examples of timers, flashers, counters, robots.

The diagrams are excellent. These books would be wonderful reference and source of circuits suitable for construction by beginners at club nights, or to introduce a keen school-child to electronics. Highly recommended!

This month's problem

See figure 4(b). This high-pass Tee antenna matcher transforms an

continued on page 22

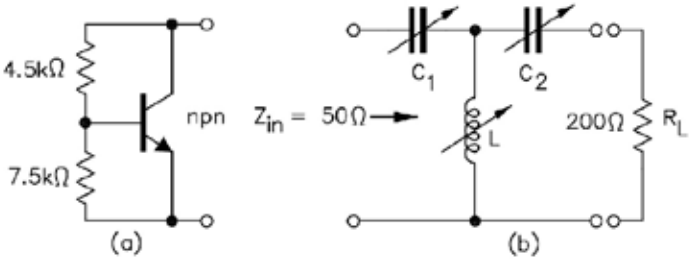


Figure 4: a) Last month's problem, b) This month's problem.

IARU – International Amateur Radio Union

IARU Liasion Officer: John Lochhead ZL4QS
Liasion: Terry Carrell ZL3QL, Don Wallace ZL2TLL, Fred Johnson ZL2AMJ, Terry Thomas ZL4TAE, Stephen Hayman ZL1TPH, Edwin Musto ZL1BBO

IARU Region 3 Conference Summary Report

The 15th IARU Region 3 Conference concluded on Thursday 8 November after four days of working sessions were successfully concluded. A record number of 16 regional societies were represented by over 80 delegates and observers. Also attending were IARU President Tim Ellam VE6SH, and representatives from Regions 1 and 2, as well as IARU Secretary Rod Stafford W6ROD.

The conference was hosted by the Vietnam Amateur Radio Club (VARC). This is a very small member society with some 50 enthusiastic members who did a magnificent job hosting this significant international event. NZART was represented by John Lochhead ZL4QS as Delegate, with Don Wallace ZL2TLL and Terry Carrell ZL3QL as observers. Terry ZL3QL was asked to chair the Conference, recognising his skills and experience after having ably chaired the 14th IARU Region 3 Conference in Christchurch.

The theme of this conference was emergency communications and preparedness where a significant number of papers were submitted by member societies. Other reports from Regional Co-ordinators were also presented. A number of important administrative issues were discussed and agreements reached. Notable amongst these was the decision to place the Region 3 finances on a more stable footing and to increase the number of Directors in Region 3 from 5 to 6.

A proposal from the Wireless Institute of Australia for an annual award/trophy to be awarded to the highest individual operator score located in Region 3 in the IARU HF Contest was warmly endorsed by the Conference. Further details will be announced before the next IARU HF Contest.

In memory of Michael Owen VK3KI, the IARU Administrative Council announced a new award. The Michael J Owen VK3KI Award was established to recognize an individual or individuals that best exemplify the dedication and hard work of IARU volunteers.

At the conclusion of the conference six new Directors were elected for the next 3 years. These are Global Madaven VU2GMN (Chairman), Peter Lake ZL2AZ, Geoff Atkinson VK3TL, Wisnu Widjaya YB0AZ, Shizuo Endo JE1MUI and Dr Joong Geun Rhee HL1AQQ. Katsumi (Ken) Yamamoto JA1CJP continues in his role as Secretary.

The conference accepted the proposal from ORARI, the Amateur Radio Organisation of Indonesia, to host the next region 3 conference in Yogyakarta, Indonesia sometime late 2015.

A more comprehensive report will be presented in the next issue of *Break-In*.

John Lochhead ZL4QS
IARU Liaison Officer.

◂ *continued from page 21*

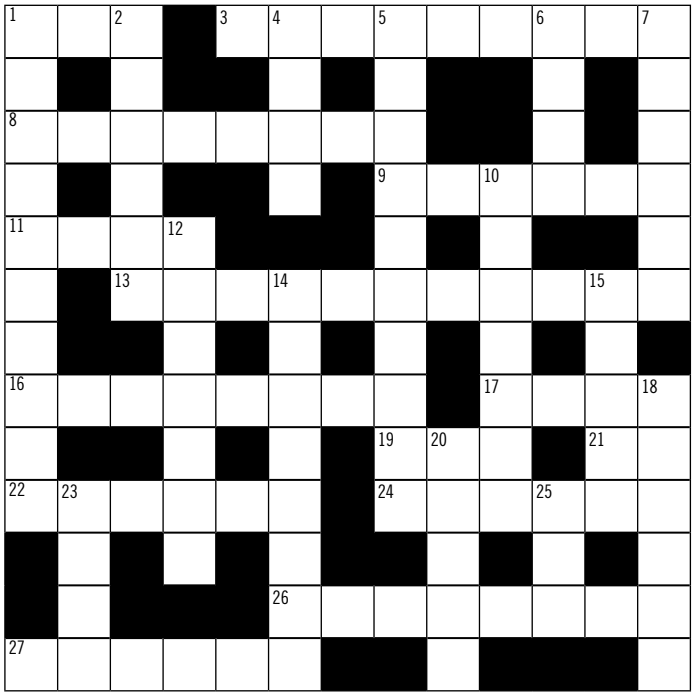
antenna impedance of 200Ω purely resistive, into the 50Ω the transmitter wishes to see. An infinite set of L and C reactance values can be found to achieve this. But there is one set where the magnitude of all three reactances are the same. Can you derive an equation for the value of this reactance? What is this value?

References:

[1] Revolution Education <http://www.picaxe.com/>
[2] See the Accukeyer at <http://inza.files.wordpress.com/2011/01/accu-keyer.pdf>
[3] Steve, VK6HV <http://members.westnet.com.au/page3/PICAXE-14M2_Electronic_Keyer.htm>
[4] Camelback keys <http://w1tp.com/im1000a.htm>
[5] LM741 datasheet <http://www.ti.com/lit/ds/symlink/lm741.pdf>
[6] 200 Transistor circuits <http://www.talkingelectronics.com/projects/200TrCcts/200TrCcts.html>

ZL Crossword 19

Compiled by Graeme Hunt ZL1ANH



Across:

1. Unit of absorbed ionising radiation dose (3)
3. Was Jesus born just west of Tauranga (9)
8. Electronic plans (8)
9. Large ZL podocarp, very resistant to rot (6)
11. 25.4mm (4)
13. If this changes, the VFO may drift (11)
16. They generate the RF which may later be amplified (8)
17. Colourless, odourless gas yet red/orange in colour (4)
19. Largest social unit in Maoridom (3)
21. Symbol for silver-white lustrous metal, atomic number 28 (2)
22. A number multiplied by itself (6)
24. Make ill (6)
26. Push the mike button (8)
27. Nineteenth book of the Bible (6)

Down:

1. They change AC to DC (10)
2. Current after passing 1 down (6)
4. Radiate (4)
5. Loss caused by retentive magnetic core material (10)
6. Extinct ZL bird (4)
7. Jet fighter maybe seen in the desert – or maybe not (7)
10. Call-sign was MGY (7)
12. Wound in a spiral fashion (7)
14. They arrive by sleigh (8)
15. River starts in HB and ends in the Mediterranean (5)
18. White then brown on the resistor (6)
20. Capital of LY, also called Vilnus (5)
23. Locations (4)
25. Founder of Megaupload first name (3)

Answers on p37

Next deadline for copy is
10 January 2013

Digital Modes

Murray Greenman ZL1BPU
<zl1bpu@nzart.org.nz>

This summer I hope to enjoy a series of adventures with a small caravan I've recently bought. It's very old (1974) and fairly small (12 ft in old money), but it is well set up for what I want. One of the attractions was independence from mains power. It has an excellent 12 V fridge, modern 12 V LED lighting, and a huge 100 Ah deep-cycle battery. I have since added a pair of 50 Ah low-leakage batteries for radio use. The van also of course has mains power and electrical certification.

My first shake-down 'cruise' was only a short one, intended to highlight any problems, and to help me work out what I'd forgotten to put on the formidable stock list; food, camping and household equipment, never mind all the radio gear! The first trip was to Big Bay, Awhitu, where I stayed in the garden of Graham ZL1QM's batch. I operated the Digital Modes Net from there, and using SSTV I sent some photographs of the setup I'd taken that day. The next weekend I operated from a camp near Thames. Over the summer you are likely to find me popping up on the net from all over the place. Remember; Digital Modes Net Friday evenings 8.30pm on 3550kHz. All are welcome.

When I have spare column space I'll write about the antennas and other equipment I use while portable. The HF antenna arrangement is very flexible, as I can erect an 11 m tall vertical for DX or a fan dipole with interchangeable legs for most bands, based largely on vintage ZC1 hardware. In the meantime, here's a shot of the HF equipment set up on the counter-top in the van.

The stack on the left (bottom to top) contains the Kenwood TKM-707 transceiver, my Codan linear, a roller-inductor L-match tuner and the separate Pi-match 500 pF capacitor used with dipoles. All the tuner accessories and cables pack inside the tuner box, which has a hinged lid. On the right is the little EEPC 'netbook' which runs digital modes and SSTV, as well as email, camera downloads etc. I have an inverter to power it from the van battery when required. I can also connect the computer to the Internet via a WIFI 'hotspot' on my smart phone and even make Skype calls. All the above-mentioned equipment stows in an equipment box with a 5 W solar panel on the lid. [1]

Figure 1: HF equipment set up in caravan.

New Network Analyzer

At present I tune up my portable and mobile antennas the slow, painstaking way, with my netbook, a USB-powered Spectrum Analyzer, a return loss bridge and a USB signal generator. What I need is an antenna analyzer of some sort! Some while ago I reviewed a Vector Network Analyzer (the AIM4170)[2], TenTec/TAPR also offered a similar one. [3] The VNA is a really useful tool that makes tuning up antennas or tweaking filters a pleasure. I would like to hear comments from anyone who has one of the newer VNAs, especially the DG8SAQ VNWA3, [4] which goes up to 1.3GHz.

I have just learned of a really smart completely self-contained VNA. [5] The SARK-110, apparently designed by EA4FRB, contains a complete analyser and the computer to control it, has a touch screen and provides a colour graphical display. It operates from 0.1 to 230 MHz with 1 Hz resolution. The unit is quite inexpensive (US$330) for what it does, and will fit in your pocket. The SARK-110 will operate in a sweep mode for antenna testing, will generate Smith charts, in fixed frequency mode, and as a frequency domain reflectometer for cable testing.

For anyone with an interest in antennas or filters, what better Christmas present could you want (hint, hint)!

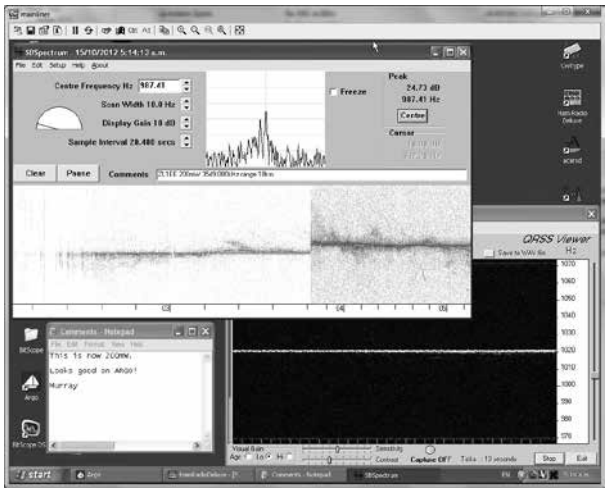


Figure 2: Remote view of computer screen.

NVIS Experiments

I was recently asked to comment on the best way to send low-power, low-bandwidth data from a series of collection points in a forest. There are several problems with this type of activity. The most important are forest attenuation, range and power budget, but of course equipment size, portability, cost, complexity, reliability, operational details and so on also need to be considered. I thought that the best approach to this problem would be to use a low power MEPT technique. I knew from past experience that NVIS (Near Vertical Incidence Signal) propagation provided good range during early evening and most of the morning, and decided to test the idea under realistic conditions. My calculations on power budget told me that a small 1 W solar panel would provide enough power for daily transmissions without direct sunlight.

While I couldn't quickly plant an instant forest, I could at least try out the idea over hilly rural land, and chose the path between my place and that of Andrew ZL1WJQ at Patumahoe. The range, about 15 km, was outside ground wave range on 80 m, where I planned to test. The setup was really cute: Andrew's transceiver is CAT operated, and he placed his computer on the Internet via a VNC (Virtual Network Computer) server. This meant that I could access his computer remotely, operate software on his computer, control his rig (using HRD), and of course see what I was doing via a replica of his computer screen on my own computer!

In Figure 2, which is a local screenshot of what I saw on Andrew's computer, you can see that I've arranged two spectrogram programs on the screen (I ran them remotely from shortcuts on his screen). Top left is the specialised Doppler-measurement program SBSpectrum by Peter Martinez G3PLX. Beneath it on the bottom right is the familiar screen of ARGO by Alberto deBene I2PHD. Bottom left I've opened a small Notepad window, in which I was able to type comments for Andrew to read, and of course for him to reply at his leisure.

Although not shown here, there was also a Ham Radio Deluxe window open, through which I could control everything on Andrew's transceiver.

At the time of the screenshot I was running a 200 mW carrier on 3549.000 kHz, which you can see on the ARGO trace. The trace looks a little wobbly, sometimes a bit 'thready' but that's about all you can tell. However, if you look at the much slower and higher resolution

continued on page 24

continued from page 23

SBSpectrum trace, you can see that my carrier, as received, has numerous components. As well as the very weak ground wave signal there is a strong E-layer signal and 'clouds' of F-layer energy, which do not show as a focused ray at this slow recording speed since the F layer changes quite quickly.

This next picture, also via the VNC, shows my transmitter sending Sequential MT-Hell with one-second dots, still at 200 mW, received on ARGO as QRSS3. At this time of the day (9 am) the F-layer signal is quite strong and you can see how it would be quite easy to send and receive telemetry with this setup. I imagined up to 1200 field stations with two-letter/number call-signs sending five bits of data in three-character bursts. Each transmission would take under one minute. This visually decoded mode can easily be transmitted by a very simple micro-controller, and all it takes to generate 200 mW efficiently is a single CMOS chip. Of course you need a fair sized antenna for such an application, but I don't see that as a problem in a fixed location in the bush. Even better, because of the nature of NVIS, reception improves the further away you are from the field stations!

Figure 3.

While I have yet to test the idea again using a true digital mode (I will next time the VNC is running), I also know that DominoEX works very well under similar circumstances. This mode is very immune to both drift and NVIS propagation problems, and was designed for 80m. Some years ago Clayton VK1TKA (at the time ZL2TKA) developed a very sophisticated one-chip DominoEX telemetry transmitter based on a 3.58 MHz TV crystal, and I was able to copy its signal day and night! It ran 100 mW and used DominoEX4. Reception during the day was not perfect, but I received good data frames several times each hour. At night reception was perfect.

New LF/MF DX mode

Over the last month or so experiments have been going on in Europe with slowed-down WSPR. WSPR was developed for propagation reporting on HF, and so is not entirely suited to LF or MF where narrower bandwidths can be used to advantage since the bands are more stable. What experimenters would do is digitally record standard speed WSPR (which has two minute frames), and slow it down to say five or ten minutes for transmission using an audio editor. At the receiving end the reverse process restored a viable recorded WSPR signal, which could then be read using the standard WSPR software. The purpose was of course to improve the sensitivity for receiving even weaker signals, and achieved this by exchanging transmission time for reduced bandwidth. The trouble was that this arrangement was not real time, was very cumbersome and it proved difficult to tune the signals accurately and to get the timing correct.

The developer of WSPR (Joe Taylor K1JT) learned about this sneaky activity, and quickly started developing a test program (called WSJT-X), which does this type of thing in an integrated real-time manner.[6] While not entirely bug-free at present, and not yet tuned for maximum performance, this new program reportedly extends performance significantly. WSPR sensitivity on HF is very good (-28dB S/N in a 2.4 kHz bandwidth). The slowest mode in this new program (called JT9-30) has a 30-minute transmission time and already has demonstrated a sensitivity of -40dB S/N!

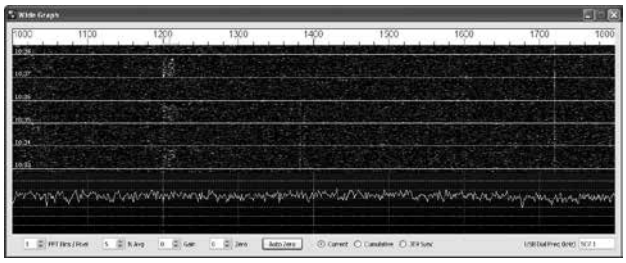


Figure 4: Waterfall screen shot of JT9.

I have been experimenting with this new software on 600 m, and although results have not been especially good, largely because of the experimental state of the software at present, and few stations running it, I have been able to have reception confirmed by two stations in VK2 and one in ZL2. Not bad for an EIRP of 100 mW!

Figure 4 shows the waterfall display of the new WSJT-X program, as captured by John VK2XGJ. If you look closely below the 1200Hz marker you might see very faint traces of my signal in bursts every other minute. John also received several correct decodes of the message at –25dB S/N. Figure 5 shows the main screen of the new WSJT-X program running on the computer of David VK2DDI, who has one of the best MF receiving sites around. At the top you can see the log window, with two clear decodes of my message 'ZL1EE RF72'. The weakest reported signal was –31dB. Under this window are all the various settings and controls for this new program.

While the calibration of the new software has not been checked, it indicates at least 3dB improvement over WSPR, not bad considering the faster transmission time. I will next run some tests with JT9-5 (five minute transmissions) to see what improvement there is. By the time you read this, I am sure that the new mode will be fully established, the software stable and with all the bells and whistles added.

I should also mention that neither of the VK stations ever heard my signal, nor was it visible on the conventional QRSS3 grabber at VK2DDI on the same evening. This immense sensitivity does mean that skeds and listening arrangements need to be made with great care; setting things up before-hand by email, knowing the exact frequency to tune to, and having the computer timing at both ends precisely aligned with Internet time. Could QSOs made this way be claimed as real contacts? I doubt it! More information is exchanged in setting up the contact via the Internet than is ever transferred by radio!

Another Talking Clock

I found another talking clock the other day at a popular electronics store. The clock is quite small, and roughly egg-shaped, with a built-in light. I'm sorry now that I didn't try it before I spent my $5! Compared to the older and much more expensive

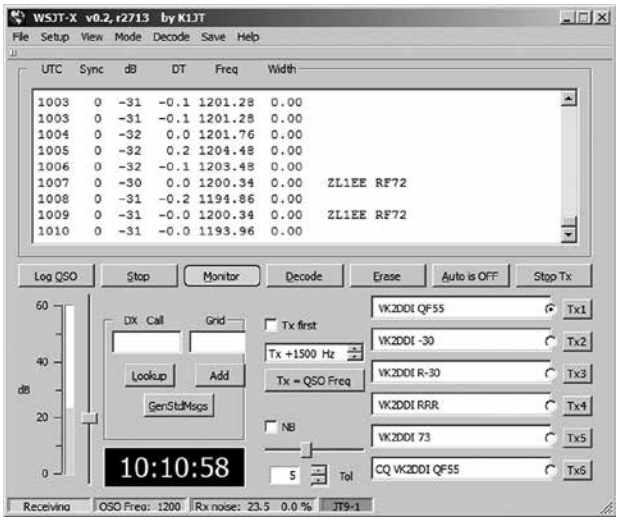


Figure 5: The main WSJT-X screen.

Around the Branches

Brightwater Scouts FM Radio Buildathon.

Nelson Br 26 NZART, Brightwater Scouts' FM Radio Buildathon

The Brightwater Scout Leader Martin Harrison ZL2TMH contacted Topsy Scott ZL2LS after the successful RadioTek at this year's NZART Conference in Nelson enquiring as whether a similar construction activity could be arranged for his scout troop. Topsy checked out kitset availability from the Christchurch Branch 05 RadioTek's team leaders Rory Deans ZL3HB and Kelvin Barnsdale ZL3KB and after confirmation and discussion it was decided to go ahead with an FM broadcast radio kitset for the scouts.

Branch 26 made an application to the NZART Radioscience Education Trust seeking assistance with sponsorship for this youth radio activity. Their prompt and positive response received was welcome news and the project was underway with the construction night scheduled to occur on Tuesday the 30th of October.

The night arrived and Nelson Branch 26 members Topsy ZL2LS, David ZL2BCA, Jim ZL2BHF, Paul ZL2PO, Pete ZL2FSK, Barry ZL2BAZ, Stewart ZL2STR, Derek ZL2IFR, Peter ZL2PHS, Martin ZL2TMH (Scout Leader), Eric ZL2BMI, Steve ZL2ASC and Andrew ZL2HZ assembled at the Brightwater Scout Hall a half hour or so before the scouts arrived and a set up construction areas with soldering irons and an assortment of useful tools. On arrival each scout was assigned to a Branch 26 technical mentor and took a place at the mentor's construction area. The scouts ranged from 11 to 14 years of age and after a little individual tuition displayed some impressive soldering skills. This achieved, the assembly of the radios kit sets was underway. After a construction period of about two hours half of the kitset FM radios were producing an output. The smiles and pride of the young scouts with their constructional achievements indicated this activity was truly worthwhile. In fact so much so, that the scouts were enthusiastic to make a return to the construction zone. This occurred on the 6th of November and the scouts assembled an audio amplifier to add to their FM radios. At the end of the evening the scouts departed for home with their own completed FM broadcast radio and big smiles.

Nelson Branch 26 thanks the NZART Radioscience Education Trust for their sponsorship support for this activity and Rory Deans ZL3HB and Kelvin Barnsdale ZL3KB for their advice.

Reporter Jim ZL2BHF

Andrew ZL2HZ and Scout Leader.

Tane with Topsy ZL2LS and Steve ZL2ASC.

Paul ZL2PO and Taylor.

Pete ZL2FSK and Sam.

---

ones I reviewed in the last column, this one is a sad joke. I spent more on the CR2032 coin cells to power it than the initial cost of the clock! The audio is terrible; distorted and scratchy. The clock is unreliable, and resets itself frequently. I've not been able to make any use of it, and it also came with no understandable instructions. There are three setting buttons on the bottom and the top cover can be pressed (a bit like a computer mouse) at the front to make it speak, or at the back to light the LED light.

Old Stuff

At the recent Western Suburbs Radio Club Sale I picked up an interesting old HF SSB transceiver made in the mid-70s by Radio Engineering Ltd, Dunedin. It is an SGC SG711E/NZ, made under licence from SGC Inc, and is in quite good condition, although rough on the outside.

Now SGC stands for Stoner-Goral Corp, and the Stoner in question was the late Don Stoner W6TNS, a well known author on Amateur radio subjects who died in 1999. [7, 8] I believe Don also wrote for *CQ Magazine* for many years. Pierre Goral died in 2004, but the company is still operating and is best known for its 'Smartuner™ automatic tuners.

If anyone has information about the SGC SG711E/NZ, perhaps the New Zealand manufacturing history, the manual, but especially the circuit diagram, I'd be very pleased to hear from them.

References

[1] See A Solar Powered Equipment Box, *Break-In* July-August 2010, page 13.

[2] <www.arraysolutions.com/Products/AIM4170.htm>

[3] <www.qsl.net/n7kzz/ttvna.html>

[4] See <www.sdr-kits.net/VNWA/VNWA_Description.html> and QEX Jan-Feb 2009

[5] <www.seeedstudio.com/blog/2012/10/10/preorder-now-pocket-size-antenna-analyzer-sark-110/>

[6] Download WSJT-X from <www.physics.princeton.edu/pulsar/K1JT/wsjt.html>

[7] <www.sgcworld.com/history.html>

[8] I have a copy of his *New Sideband Handbook*, Cowan Publishing, 1958.

Longer Wavelengths

Con Wassilieff ZL2AFP
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JT9, a new digital QSO mode for LF/MF

Joe Taylor K1JT has developed a variant on his popular WSJT modes (Weak Signal Joe Taylor), this time to suit LF/MF weak signal conditions. It is in an early stage of development and there are a few bugs yet to be fixed, but it has already been a success in Europe. It is called WSJT-X and the current version can be downloaded from [1].

Early tests at my QTH were not successful, with patchy decodes of the message from ZL1BPU even for good signal strengths. Accurate timing and frequency stability is critical. It seems that even small drifts in timing will result in no decoding of the message. In its present form it is too unreliable as a viable communication mode, but improvements are on the horizon. A description of the new mode is found in the WSJT-X "Quick Start Guide", an extract of which follows:

"WSJT-X is an experimental version of WSJT implementing JT9, a new mode designed especially for use on the MF and LF bands. JT9 shares many characteristics with the popular modes JT65 and JT4. All three are designed for making QSOs under extreme weak-signal conditions. They use nearly identical message structure and source encoding. JT65 is used for EME on the VHF/UHF bands, and for worldwide QRP communication at HF. JT4 is used mainly on the microwave bands. In contrast, JT9 is optimized for the 1.8 MHz, 472 kHz, and 137 kHz bands.

JT9 offers five choices for the duration of timed T/R sequences: sub-modes JT9-1, JT9-2, JT9-5, JT9-10, and JT9-30 use 1, 2, 5, 10, and 30 minutes, respectively. Sub-modes with longer transmissions trade reduced throughput for smaller bandwidth and increased sensitivity. The slowest sub-mode, JT9-30, has total bandwidth 0.4 Hz and operates at signal-to-noise ratios as low as -40 dB measured in the standard 2.5 kHz reference bandwidth.

JT9 is a mode designed for making QSOs at MF and LF. The mode uses essentially the same 72-bit structured messages as JT65. Error control coding (ECC) uses a strong convolutional code with constraint length K = 32, rate r = 1/2, and a zero tail, leading to an encoded message length of (72+31) × 2 = 206 information-carrying bits. Modulation is 9-FSK: 8 tones for data, one for synchronization. Sixteen symbol intervals are used for synchronization, so a transmission requires a total of 207/3 + 16 = 85 channel symbols. Symbol durations are approximately (TRperiod – 8) / 85, where TRperiod is the T/R sequence length in seconds. Exact symbol lengths are chosen so that nsps, the number of samples per symbol (at 12 000 samples per second) is a number with no prime factor greater than 7. This choice makes for efficient FFTs. Tone spacing of the 9-FSK modulation is df = 1 / tsym = 12 000 / nsps, equal to the keying rate. The total occupied bandwidth is 9*df. The generated signal has continuous phase, and there are no key clicks."

So, unlike the highly secretive OPERA mode, of which I have written previously, all of the details of this new mode have been made available, as has the source code for the program. Now this is what amateur radio is all about!

And now for something completely different.

Finite Element Analysis

The capacitance of antenna wires and the inductance of coils and transformers are of interest to builders of radio equipment. There are standard formulas and software calculator packages out there for determining these things. But there is another way of doing this, by a mathematical simulation technique called Finite Element Analysis.

Finite Element Analysis (also called the Finite Element Method, FEM) approximates a continuous system (such as a wire above ground or a transformer with windings) as a mesh consisting of discrete subdivisions (called finite elements). FEM uses a system of points called nodes which make a grid called a mesh (Figure 1). This makes perfect sense when you are talking about a physical structure such as a bridge, where the mesh will consist of steel beams connected to each other at points (nodes) but it also applies to a system of electric fields and electric charges.

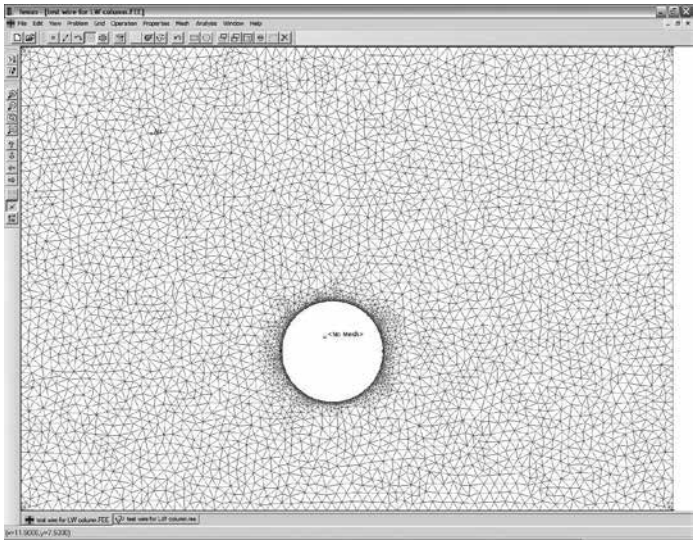


Figure 1: Screen shot from FEMM showing the finite element mesh.

The mesh is programmed to contain the physical properties which define how the system will react to forces. In the electromagnetic case that is of interest to us, Maxwell's Equations are solved in each of these mesh regions, with the condition that the solutions are continuous across mesh boundaries. The mesh can be made as coarse (quick computations but low accuracy) or as fine (slow computation but high accuracy) as required.

For example, a conductor above ground could have an applied voltage *V* which will result in electric flux to ground and a subsequent electric charge *Q* deposited on the conductor. The charge can be determined by the FEM technique and a bit of integration and the capacitance of this conductor with respect to ground is then determined as the ratio of *Q* to V, recalling that $Q = CV$.

Not very many years ago, finite element analysis was the preserve of universities and clever people. But all that has changed. The advent of fast computers and readily available software means that even ordinary folk like me can now dabble with the finite element method. Most FEM software seems to be developed with physical structures in mind (such as vehicles responding to stresses) but there are some (well, I found at least one) that have electric and magnetic fields as their primary focus.

I have been experimenting with a small program called "Finite Element Method Magnetics" (FEMM) which is a (free) 7 MB download [2]. It does things in two dimensions only, with an "axisymmetric" option, but many electric and magnetic situations are readily resolvable into two dimensions, such as a long straight wire, or a transformer.

Figure 1 depicts a cross section through a round wire above perfectly reflecting ground, bounded by a rectangular region of air. The finite element mesh has been created by the program and you can see that FEMM has applied a fine mesh in the vicinity of potential regions of interest, such as the surface of the wire and corners of the region of bounding rectangle. Although it is not obvious in figure 1, the bottom of this rectangular region is given the properties of a perfect conductor at zero potential, while the sides and top are modelled in a way that represents an infinite region of space. Selection of the boundary conditions is important in obtaining a sensible result, and is easy to do in practice. The manual that comes with the program is really excellent.

Figure 2 shows the results of running the model. The applied voltage creates electric flux lines (arrows) that are directed towards the ground (note that the flux is exactly normal to the ground plane – this is one of the boundary conditions of the model). The equipotential contours (normal to the flux lines) around the wire are reflected from the ground plane, and the other boundaries are effectively transparent (again,

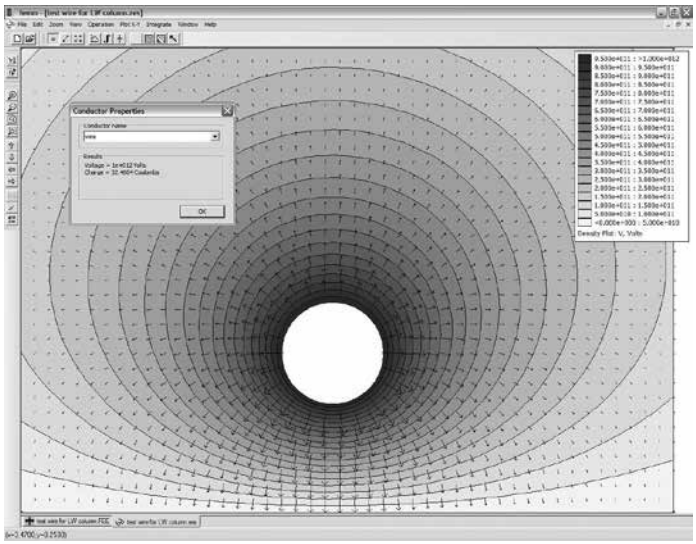


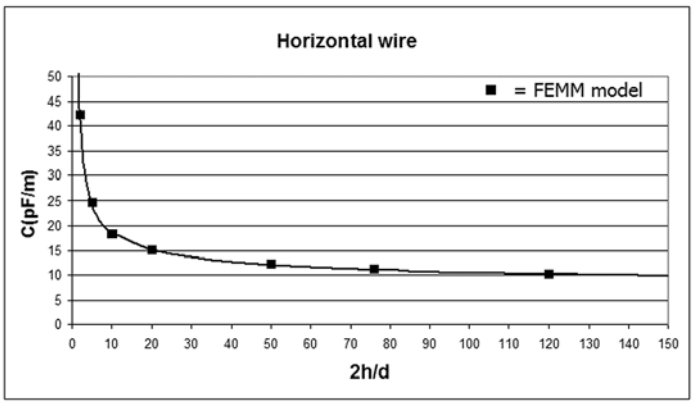
Figure 2: Screen shot from FEMM showing the results of the computations.

this is a boundary condition). In this model the wire is very close to the ground and is exactly 1m long (sticking out of the page). The little dialog box in figure 2 shows the applied voltage (in this case 1012 volts), and the charge on the wire (about 32 coulombs) calculated by the program by integrating the flux around the wire. Because of the choice of voltage as 1012 volts, the reading in coulombs equates to the capacitance as pF. So in this instance the wire has a capacitance to ground of 32 pF/m.

Vertical wires (eg the upwire of an inverted L antenna, of which the horizontal section can be modelled as above), are modelled as "axisymmetric", with the wire located on the r=0 axis. It is easier to do than explain, and the program comes with a range of examples that demonstrate its capabilities.

Figure 3 presents standard formulas for the capacitance of vertical and horizontal wires. The charge distribution on a vertical wire close to ground varies along the length, due to the effect of the ground being greater at the bottom end of the wire. For a horizontal wire the ground affects the charge evenly, hence the different formulas for each.

Figure 4 presents the predictions of the formulas for vertical and horizontal wires against the results of the FEM model. Pretty good agreement. Somewhat counter-intuitively, the predictions of capacitance per metre for the horizontal wire are dependent only upon the ratio of diameter to height above ground, and not upon the actual diameter of the wire. So the capacitance of a 1mm diameter wire 10m above ground will be the same as that of a 10mm diameter wire 100m above ground, at least for a very long wire.



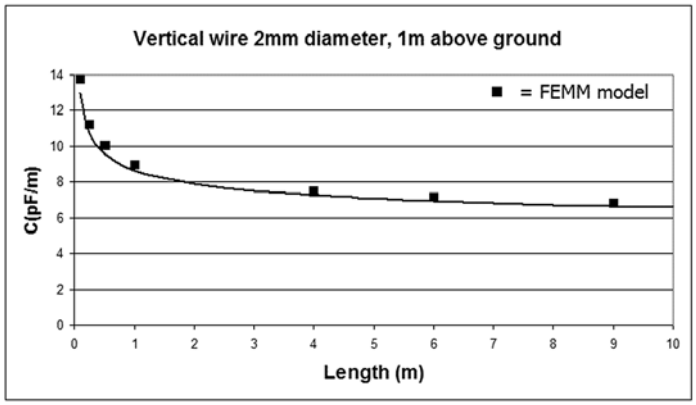


Figure 4: Comparison of predictions of formulas with the FEMM model.

Now, one might ask that as the standard formulas for the capacitance of wires are pretty good, why bother with a complicated technique such as the finite element method for such simple configurations? The answer is of course that the finite element method is so much more versatile and can model complex configurations such as multiple wires of different diameter in parallel, the effect of additional reflecting planes, etc. Try finding an analytic formula for that!

Next time I will show what FEMM can do with transformers. In the meantime, I recommend downloading the program and trying it out. It is a terrific learning tool and great fun simulating real wires, coils, transformers, motors, in fact all sorts of electromagnetic applications.

Tinakori Hill DGPS station QRT

The Differential GPS station transmitting a strong FSK signal from Tinakori Hill, Wellington, on 1818.5 kHz, has ceased operation. The signal was inside the 160 m amateur band and caused "buckshot" noise for local receiving stations. Such stations were of use several years ago when the GPS for non-US military receivers had "selective availability" (ie poor spatial precision), and the transmissions from these DGPS stations were used to improve the precision. Now that even domestic GPS receivers have the same extended precision, there is little need for the DGPS stations.

600 m net

The Thursday evening 600 m net will be meeting fortnightly, on odd Thursdays, with the co-ordination net on 3666 kHz starting at 8.30 pm. The coordination net has also used 7166 kHz, due to poor propagation on 80 m resulting from the increasingly longer daylight hours. So if you do not hear anything on 3666 kHz, QSY to 7166 kHz just in case.

References

[1] <http://physics.princeton.edu/pulsar/K1JT/WSJTX_03r2717.exe> (likely to be updated by now)

[2] <http://www.femm.info/wiki/HomePage>

[3] "Approximate capacitance formulas for electrically small tubular monopole antennas", NUWC-NPT Technical Report 10,817, 19 January 1995

[4] <http://www.strobbe.eu/on7yd/135ant/>

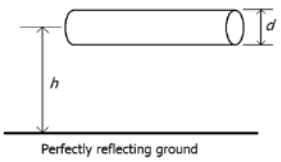
HORIZONTAL WIRES

$$C\ (pF/m) = \frac{2\pi\varepsilon_o}{\log_e\left[\frac{2h}{d} + \sqrt{\left(\frac{2h}{d}\right)^2 - 1}\right]}$$

where ε_o = permittivity of free space (= 8.85pF/m)

ON7YD provides a simplified formula that is accurate for h/d values greater than 3

$$C\ (pF/m) = \frac{24}{\log_{10}\left[\frac{4h}{d}\right]}$$



VERTICAL WIRES

$$C\ (pF/m) = \frac{2\pi\varepsilon_o}{\log_e\left[\frac{2L}{d}\right] - \gamma}$$

where γ is equal to 1-$\log_e$2 for large h, and 1 for small h

C is not very sensitive to h and so the formula simplifies to:

$$C\ (pF/m) = \frac{24}{\log_{10}\left[\frac{1.15L}{d}\right]}$$

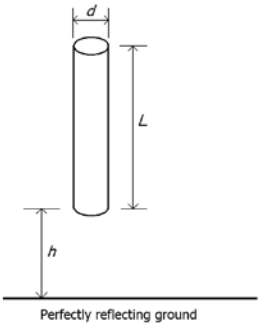


Figure 3: Exact and approximate formulas for capacitance of wires above ground.

Satellite Orbits

Andrew Barron ZL3DW
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Simon 2E0HTS posted a photo of his tripod mounted satellite array on the Internet. Due to the low height he found it was better to set the 145 MHz Yagi vertical and reports hitting AO-51 with ease as well as some excellent QSO's via AO-7 and VO-52 on SSB. This setup is an ideal portable back yard or holiday arrangement.

If you have a hard time hearing your own downlink but have no trouble hearing other stations, you may be experiencing 'desense'. This is where your transmitter signal overloads your preamp (or receiver) causing it to become temporarily less sensitive. The overload condition may also be accompanied by white noise or intermodulation distortion where you hear distorted signals in your receiver, including possibly your own transmit signal, but only when you are transmitting. If reducing your transmitter power clears up this condition, you are most likely experiencing desense. Interference problems are especially common when transmitting on 2 m and receiving on 70 cm to work VU mode satellites. The issue here is the strong 3rd harmonic of the signal around 145 MHz causing problems at 435 MHz where you want to listen to the downlink. I have been very confused chasing phantom downlink signals when working FO-29 which has a VU mode linear transponder.

Several solutions exist and an easy one is to just reduce your transmit power. This may solve the problem but it will probably limit your ability to operate when satellite conditions are difficult such as near AOS or LOS or when the satellite transponder is especially busy. Another way to solve this problem is to increase the separation of your 2 m and 70 cm antennas. This approach will work if you get them far enough apart but may not be practical for many stations.

An excellent tip I found recently was a cost effective way of eliminating this type of interference at UHF from your own VHF transmission. The solution is to use one of the reasonably inexpensive and commonly available 70 cm / 2 m diplexers, (usually referred to as duplexers), to add high pass filtering to the UHF antenna feed. These 'duplexers' are the type such as Diamond MX72, Comet CF-416, MFJ-916, or Yaesu AD-2 commonly used to combine 2 m and 70 cm on the same antenna, or a single feed on to two antennas. The drawing shows the VHF port of the diplexer left open and this is probably OK, but I would probably terminate it with a 50 Ohm load. The diplexers are rated for transmit power so will not affect operation when you switch to UV mode. In the much less likely event that your UHF transmission is affecting the VHF receiver or pre-amp you could place a second coupler as a low pass filter on the receive antenna before the pre-amp.

The team that developed the PRISM satellite has announced that it is being opened up for use by radio amateurs. The satellite was built by the University of Tokyo and launched on January 23, 2009 into a 660 by 670 km orbit. It uses AX.25 packet radio and can now be used by amateur radio operators as a store-and-forward message box. See <http://www.space.t.u-tokyo.ac.jp/prism/en/HAMservice.html>

Five research CubeSats – all with Amateur Radio communication systems – were successfully deployed from the International Space Station beginning around 1430 UTC on October 5th. The satellites were launched from the Kibo station module using a specially equipped robotic arm. The group includes: TechEdSat which will be sending AX.25 packet telemetry at 437.465 MHz. The TechEdSat team is asking for assistance from amateurs in decoding and relaying data. Follow the mission on their Twitter page at, http://twitter.com/TechEdSat. More information about decoding and submitting packet data is available on their website. FITSAT-1 designed and built at the Fukuoka Institute of Technology, Japan, will test the feasibility of high-speed microwave data downlinks in low Earth orbit. (Doppler is a big problem for high frequency operation at low altitude orbits). It will transmit telemetry on 437.445 MHz and 5.84 GHz. They welcome signal reports from amateurs at their website at, <http://turing.cs.fit.ac.jp/~fitsat/>. WE WISH, from the Meisei Electric Company Radio Club, Japan, will send CW telemetry and occasional SSTV images at 437.505 MHz. RAIKO, designed and built by students at Wakayama University, Japan, will transmit high-speed data at 2.2 and 13 GHz. F-1, built by students at FPT University in Hanoi, Vietnam will send telemetry at 145.980 and 437.485 MHz using 1200-baud packet and CW. Amateurs are asked to monitor and submit reports. More information can be found at <http://fspace.edu.vn/?page_id=27>

BUAA-SAT is a university micro-satellite project developed by the students of Beihang University (Beijing University of Aeronautics and Astronautics). It will carry an amateur a +27 dBm U/V FM voice transponder for the use of radio hams world-wide as well as a +20 dBm CW beacon and a +27 dBm AX.25 beacon also in the 145 MHz band. The satellite has a mass of 30 kg, dimensions of 30 cm x 30 cm x 50 cm and aims to go into a 600-800 km Sun Synchronous Orbit (SSO) from Taiyuan in late 2014. BUAA-SAT website <http://sat.buaa.edu.cn/>

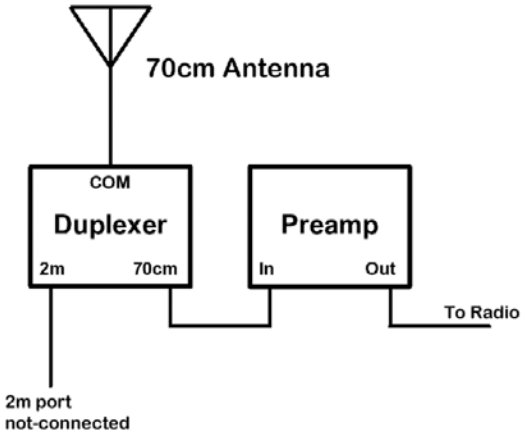
The Chinese Amateur Satellite Group (CAMSAT) is building two micro-satellites CAS-2A1 and CAS-2A2 which will be of great interest to satellite operators. They are to be combined into a binary system for amateur radio communication and education. There will be a radio link between the two satellites when they are in suitable positions in their orbits, so that the amateur radio communication coverage can be extended. Both spacecraft are 25 kg, 270x270x250 mm and are planning to launch from Taiyuan into a sun synchronous, 1000 km apogee, 99.5 degree orbit.

CAS-2A1 will have VHF CW, voice and telemetry beacons, a UV linear transponder, an LS linear transponder and a UV mode APRS repeater.

CAS-2A2 will have UHF CW and telemetry beacons, telemetry on 2400 MHz and 10 450 MHz and a VU mode linear transponder.

The British UKube-1 spacecraft is expected to launch on a Soyuz-2 launcher from Baikonur in Kazakhstan in March 2013. UKube-1 is a demonstration CubeSat mission designed to provide a platform for up to three technology demonstrator payloads. In addition to these payloads the satellite will incorporate innovative attitude determination and control systems, deployable arrays, FPGA on board mission controllers. There will be four communications systems; a U/V digi-mode transceiver using either 1k2 or 9k6 BPSK for downlinks, a UV transponder, a 1 watt S Band transmitter for high data rate mission data downlinking using up to 1 Mbps QPSK or OQPSK modulation, and a UHF

2EO HTS's tripod mounted antenna.



Magazine Survey

Compiled by Grahame Fraser ZL3SJ
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Amateur Radio (WIA)
October 2012

p.3 The Foundation licence – Time for a Review?
p.15 Portable beams for VHF and UHF
p.19 80 m or 40 m to 10 m – just one loop fits all! (horizontal)
p.29 Usability and complexity
p.32 Power supply requirements – surplus equipment

QST
October 2012

p.32 Solid State 1 kW Linear Amplifier for 2 Meters (using MRFE6VP61K25H)
p.37 Those Mysterious Signals (the ones that radio astronomers listen to)
p.40 Satellite CAT Interface for Working the Analog Birds
p.44 The Shared Apex Loop Array
p.49 6 + 2 = 1 (skeleton sleeve dipole for 6 and 2 m)
p.50 Review: Alinco DJ-57T Handheld Dual Band FM Transceiver
p.53 Review: Kenwood TH-K20A Handheld 2 Meter FM Transceiver
p.60 Hands On Radio #117 Laying Down the Laws (from Coulomb, Ampere, Faraday and Lenz)
p.63 Microwavelengths: Antenna Measurements – The Antenna Range
p.71 The Evolution of DX Spotting (and the Reverse Beacon Network)
p.81 Zombie Bands: Dead bands can get up and walk
p.83 Heathkit Declares Bankruptcy, Closes for Good (Again)
p.97 Vintage Radio: McMurdo Silver's Super Gainer

November 2012

p.32 Building Inexpensive HF Power Attenuators
p.34 A Different Way to Assemble PL-259 Coax Plugs
p.36 Polar Plot Projection of Your Yagi Response
p.37 PSK31 – A Different View: easier to visualise using pictures
p.41 Emission Designators Deciphered
p.43 A Club Project – Automatic Mobile Power Control (Avoiding power-up transients)
p.46 Have Fun Building the Simplest Transmitter (xtl control, 6F6 or 6V6)
p.50 Extending That High Power Remote Auto Tuner to 160 Meters
p.53 Boat Anchor Buddy (a controller to integrate keying, antenna switching, sidetone control and receiver output)
p.57 Review: Array Solutions AIMuhfVector Impedance Analyzer
p.61 Review: DZKit HT-7 40 Meter AM Handheld Transceiver
p.70 Hands On Radio #118 The Laws at Work (demonstrations)
p.93 How's DX?: ZL9 – Auckland and Campbell Islands

Radcom
October 2012

p.19 RS Reports: Good operating practice
p.20 Homebrew: Amplification
p.24 Review: Elecraft P3 Panadapter and K3 Transceiver Revisited
p.36 Data: All the latest on digimodes (and the Raspberry Pi)
p.38 Sart Here: The sun
p.41 The Moxon Claw revisited (part 1)
p.45 The 'Number 8' dummy load
p.54 More on the CFR dipole and coax chokes
p.58 LF Be prepared (for 472-479 kHz)
p.62 VHF/UHF: Using the (marine) Automatic Identification System to spot Atlantic tropo openings
p.68 A mix of theory and practical matters in the EMC world
p.70 Safety first (when installing that new indoor antenna)

November 2012

p.14 The 15th International EME Conference (report)
p.16 What goes around, hoots around (microphone buffer phase shifter to reduce the chance of feedback)
p.23 Homebrew: RF amplifiers, mixers, and direct conversion receivers
p.30 Antennas: Can the ACE-HF propagation software be used to check antenna performance ?
p.36 The Moxon Claw revisited (part 2)
p.40 Start Here: My Tesla coil project
p.42 Design Notes: More on fractional-N synthesizers
p.62 VHF/UHF The digital revolution is here! (digital modes with relatively simple 144 MHz equipment)
p.70 Data: WSJT updated with JT65xB and new ISCAT modes

SPRAT
#152 Autumn 2012

p4 Minimalist sidetone using PUT (2N6028)
p.5 Power attenuators with carbon resistors from the E12 – series for the FT817
p.8 Repair your Weller TCP soldering iron
p.10 Spanish Tuna Tin Tranmitter
p.16 SMD oscillators on Veroboard
p.17 Taking the "Thump" out of T/R
p.20 40 m CW Receiver

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spread spectrum mode at only 11 mW with 100 kHz bandwidth.

Interorbital Systems has offered low cost launch to LEO options for up to 40 kg of CubeSats as they prepare to launch their Neptune 5 and Neptune 7 rockets. Interorbital, based in Mojave, California, develops and manufactures low-cost, state-of-the-art orbital launch vehicles and satellites for private, commercial, governmental, academic, arts, and military applications. Two flights of the Neptune 5 launch system are planned to accommodate 9 CubeSats and 23 TubeSats. Interorbital's Neptune 7 launch has already booked 10 CubeSats and 10 TubeSats to be delivered to low Earth orbit.

Sadly the AMSAT-DL P3E high Earth orbit satellite and P5 mission to Mars satellites have been delivered a potentially fatal blow. After, discussions with the German Ministry of Economics and the German space agency DLR over more than 5 years they have been formally declined for government funding. The official news release from AMSAT-DL states; "We maintain our contacts with the various launching agencies able to launch P3-E into an appropriate orbit. The tremendous launching costs kept us from more concrete talks so far. Just recently good contact with AMSAT China (CAMSAT) was established. China has suitable launchers to bring payloads into GTO. Moreover, China has discovered that amateur radio is a means of motivating young people to technical university studies. Furthermore we are very actively exploiting a potential shared ride of an amateur radio payload on a new geostationary satellite visible from Europe. We have already submitted a formal project proposal. No antenna tracking will be necessary. The big advantage of this project is that due to the operational requirements of the primary payload, our launching and commissioning is tied to the not too far future". Unfortunately the geostationary satellite ride-share option is of no use to us in New Zealand because we will not be able to 'see' the satellite.

Best wishes for a happy and safe holiday season to my few and loyal readers. May Santa bring you the new all mode transceiver and linear amp of your dreams. As always I am keen to hear about and publish details about your satellite activities, so please drop me an email to <zl3dw@nzart.org.nz> and photos are especially useful. I am also very happy to answer any questions that have you puzzled or will help you get started.

73 *Andrew ZL3DW*

VHF Scene

Simon Watt-Wyness ZL1SWW
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As this edition of VHF Scene is being started, the scribe is holidaying in Coluondra in Aussie. We came over for a holiday to escape the bad weather in ZL and find that the winds are high with mainly overcast skies, but at least it's warm! The weather did improve with hot sunny days later on in the week.

I took over my little VX5 handheld to access the local repeaters. Sadly I left my VK4 repeater list at home and had to scan around the band. Finally I found one on 146.85 MHz, the Melaney repeater. The next issue is that it appeared to be tone access. By trial and error I found it was 91.5 Hz.

I got up on the repeater and ended up having a nice chat with several people there. I found out that the week I was there was meeting night. I hooked up with VK4FSCC Glenn, who also lives in Coloundra, kindly picked me up from my apartment and took us to the club.

Sunshine Coast Amateur Radio Club SCARC is located past the north side of the Maroochy river bridge in what used to be the old Toll Gate control building. The toll system was decommissioned after public outcry and the fact that the whole toll system could be bypassed by other roads. They decommissioned the toll system much to the advantage of the SCARC.

At the meeting, the usual formal processes were done and then two speakers presented their topics. June VK4SJ gave a talk on DXing and attaining awards. June is a bit of a legacy in regard to Ham radio and is well kown in the states and several people were asking about her at a recent Dayton convention. She has a raft of several awards and the certificiates as proof of her Dxing prowess.

Additionally John VK3BSE spoke about some projects he has made using a low cost microprocessor chip made by Texas Instruments (TI) MSP430Gxx. A Google of TI Launchpad will reveal results. USD 4.00 will get you two micros and a small programming board that is programmable by USB.

On top of this I also saw a neat demo of some free SDR software that uses a cheap DVB-T USB dongle from EBay® for about $20. This SDR combination can receive from 64 MHz to 1700 MHz on all modes. The UI is very resposive with a nice waterfall and spectrum display. It would make agreat addtion to the shack to listen to oscillators for phase noise etc at a great price. More details of these subjects are further down in the column.

This club is very dynamic and has a great social scene alongside the ham activities, frequent camping trips as well as HASH (Hams At Someone's House) where a group of hams converge at a nominated ham's house for a social get together. The club's call is VK4WIS.

6 metre activity

Six has been percolating along with some good contacts into JA and VK from ZL1 through ZL3.

2 metre activity

Late October has been quite kind to ZL operators with DX to VK 2 and 4 on 2 / 70 and 1296. Some operators involved were ZL1AVZ, ZL1AVS, ZL1AKW, ZL1IU, ZL1TPH, ZL2ADU to name a few.

Steve ZL1TPH reports on some of his activity from one of his favourite spots.

Today the 25 October 2012, I worked from Moirs Hill portable.

144 MHz; VK2DVZ, VK2AMS, VK2BCC, VK2AWD, VK2AH, ZL2ARA, VK2ZT, VK2EI, VK-2FRL, VK4JMC, VK4OX, VK4IBR

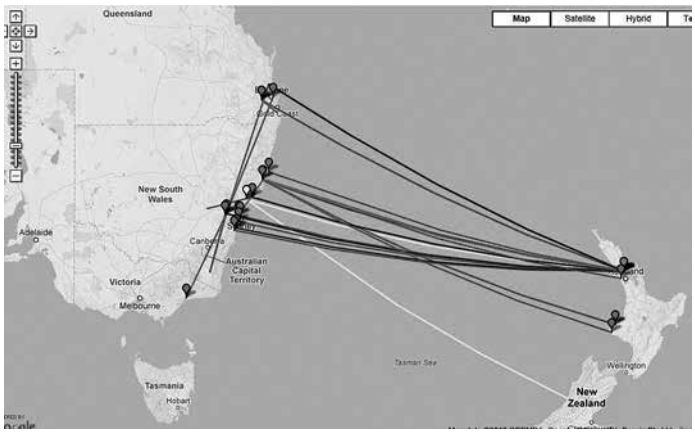
432 MHz; VK2DVZ, VK2AMS, VK2AH, VK2BCC, VK2ZT

1296 MHz; VK2DVZ, VK2AMS

The highlight today was the 432 MHz contact up to VK4OX at 2317 km.

This is the first time I have worked this band to VK4. The contact did not come easy and we both persevered for over half an hour waiting for a peak. We finally found that peak and it resulted in an easy SSB contact with chat included.

Unusual Propagation – EME Part 2



Overview of contacts had between ZL and VK.

Peter ZL4LV has been doing more experiments with the EME propagation. He outlines this below.

Since my report in the Sept/Oct issue of *Break-In* I have been able to do further tests on the EME propagation from my QTH.

To summarise, in my previous report on the 30th of June I observed very strong echoes when using the echo mode on the WSJT EME software. It indicated the presence of a major lobe from my aerial at very low angles and a higher lobe as well. At that time the strength of the return signal caught me by surprise. The WSJT program gives a report of return echo on a scale of 0 to 10: I was receiving a steady series of 10's. At that time, I was beaming to the east which from my QTH is right out over the Pacific Ocean, I was starting to receive echoes from about minus one degree before moon rise as given in the WSJT program probably due to my altitude of 200 metres above sea level.

In this direction I have a relatively small window where the moon rises above the ocean horizon so it is only possible to make observations over several days. This is only practical if the weather is settled but if strong winds are forecast I lower the aerial array.

Following observations, show no really consistent pattern. On consecutive days, the echo signals can range from nothing to strong with some moderate echoes in between. This is all at the low angle of minus 1° degree to about plus 6° degrees of elevation, but even this varies. I have been unable to repeat the high angle echo reported in the last report.

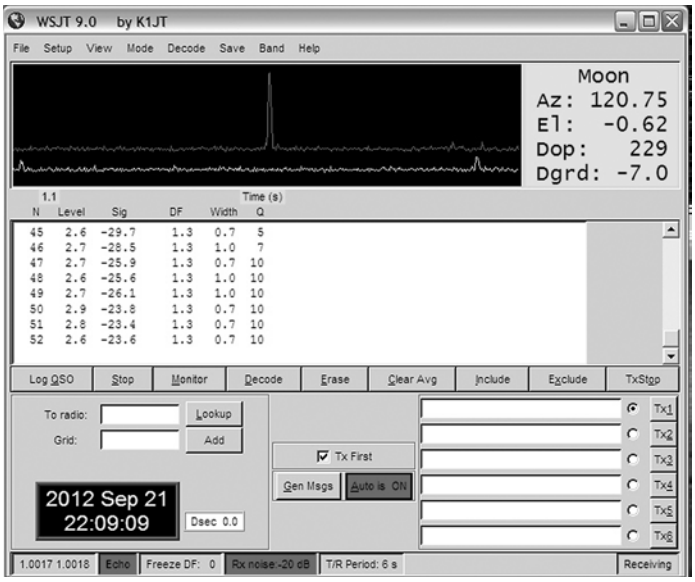
A further observation is that these results occur when the moon is closest to the earth, but this also occurs when the moonrise is over the ocean at my QTH.

These screen shots tell a lot more than lines of text. The top portion of the display shows the return signal as a prominent spike relative to the background noise, on the "10's" traces it is very prominent. On the right side of the display is shown the moon's position as azimuth and elevation. Note that in these shots the moon has just risen. Also note the Doppler shift in frequency is due to the relative movement between the earth and moon. DGRD (degrade) is a complex calculation of the expected deterioration of the signal due to a number of factors. See mmmonvhf.de/eme.php for a full explanation of the factors plus a graph of the DGRD for each month.

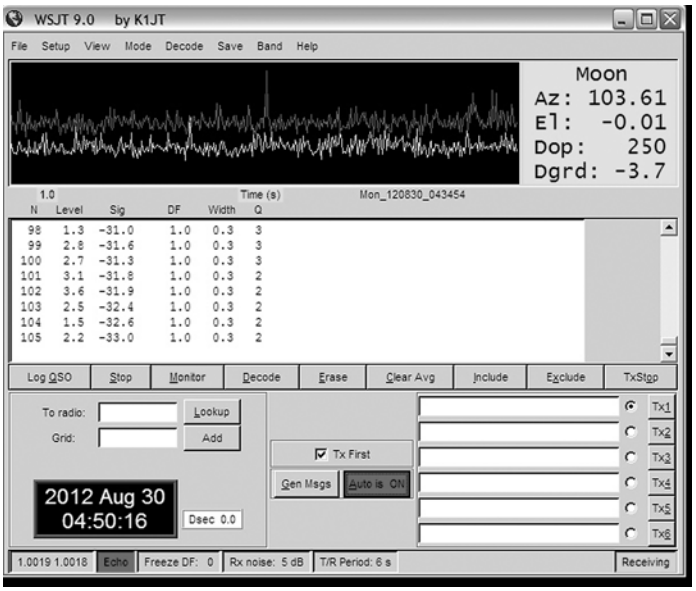
The centre portion of the display shows the received signal results, the left column is the number of transmitted pulses. The "Q" and "DF" columns are of most interest to me. "Q" is the received signal strength on a 0 to 10 arbitrary (?) scale, DF is the frequency difference between the transmitted and return frequency with correction for the Doppler shift. It should be close to 1 for a legitimate echo. It is possible for the system to lock on to noise spikes well off frequency and give a report for several periods, particularly for weak signals, the "DF" reading informs you of this. These noise spikes should also disappear because of the frequency dither built in to the program. I am not sure about the "LEVEL" and "SIG" columns, they have some correlation with the "Q" column but not completely.

These observations have raised a number of questions.

- Has anyone else also observed similar effects?



Screenshot of Echo Returns – Note the Q Column with 10's.



Screenshot of Echo Returns – Lesser Signal Strength.

- Why the big variation in the strength of the return signal from day to day?
- Have I observed some new effect?

Obviously ground gain (or ocean gain in my case) has some influence or is the significant variations in return signal just Faraday rotation? The various long distance modes we use today for example Es, tropo, probably started with this sort of observation.

I have put these observations on record in case others may have observed results similar to mine. Accumulation of reports adds to our knowledge of VHF propagation.

Dunedin is not the best location for VHF DX being surrounded by hills, this limits the directions available for low angle take off. In my case to the east I have a clear view to the ocean horizon from about 90° to 150°s, to the west it is best at about 300°, but this is looking out over the rest of the South Island with the Rock and Pillar Range just visible in the distance. All other directions I am looking into local hills of various heights. As yet I have not been able to see my echoes in the westerly direction although most of the contacts I have made have been in this heading so the lack of return echoes does not mean EME contacts are unlikely.

Other Technical

While at the SCARC in Sunshine Coast, the scribe witnessed two great little technical items. The first one being the low cost Texas Instruments MSP430Gxx series of micro. The MSP-EXP430G2 LaunchPad is an easy-to-use flash programmer and debugging tool for the MSP430G2xx Value Line microcontrollers. It has all you need to start developing on an MSP430 microcontroller device for just $US 4.30. It is a small board that has a 14/20-pin DIP socket on-board and emulation for programming and debugging and features, on-board buttons and LEDs with pin header connectivity that support a wide range of plug-in modules for added functionality such as wireless, displays and more.

The MSP-EXP430G2 LaunchPad also comes with 2 MSP430 devices, with up to 16 kB Flash, 512B RAM, 16 MHz CPU speed and integrated peripherals such as 8ch 10-bit ADC, timers, serial communication (UART, I2C & SPI) and more.

The other item of interest was using a low cost USB DVB-T tuner in combination with some open source software called SDR# (SDR Sharp). It was written in C Sharp hence the name. Some driver installation using "zadig" will have the correct drivers installed and ready to go.

Coverage is expected to be around 64 to 1700 MHz. In reality, mine went a little lower than 64 MHz. Not all USB tuner modules are created equal. The best combination is the RTL2832u Chipset with the Elonics E4000 tuner chip. The front end is fairly broad although there are some semblances of filtering but around 10 dB rejection or so.

It works quite well but you can notice a little 'PIP' in the centre of the pass band that stays static when changing frequency. This is due to a small IQ imbalance. There is IQ correction that can minimise the pip. There is the facility to reverse the IQ as well.

I purchased two of these USB dongles and they duly arrived from Hong Kong some 15 days later. Interesting to note, my test of the first one revealed it was deaf. Subsequent testing against the second one which performed perfectly, showed a 40 dB difference in gain. I opened up the so called dud one and checked for shorts / opens near the Belling Lee socket. Man these things are tiny!! Nothing obvious was found but I did play later on, with the AGC settings in a configuration button to turn on AGC. This brought it to life. Now I don't know if this massive gain variance is typical of these devices but would be interested to hear from readers that may have played with several of these.

2012 VHF-UHF-SHF Contest Calendar

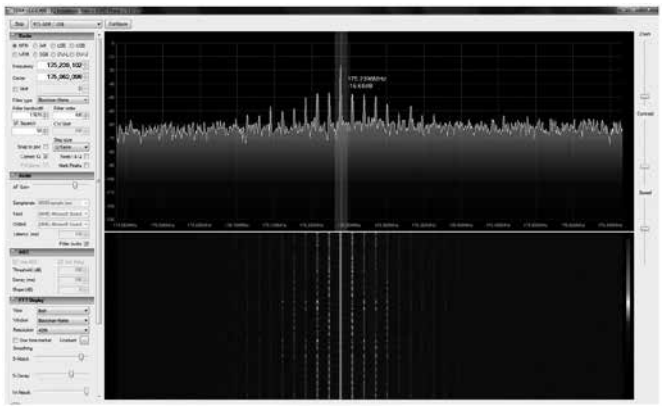
Field Day Contest; All bands 50 MHz and up. (1 & 2 December)

DX Weekend; All bands 50 MHz and up. (2 & 3 Februrary)

For all contests, the operating periods are 1700 to 2300 on the Saturday, and 0700 to 1300 on the Sunday, NZ local time. The Contest Rules are available at: <www.vhf.org.nz/VHF-UHF-SHF-ContestRules> . All contest logs should be sent, to arrive within two weeks, to: zl2wa@clear.net.nz

Summary:

Many thanks go to the contributors who help make this column happen with their input – ZL4LV, ZL1TPH and others. If you have input and pictures for the columns ahead; such as DX activity reports, repeater installation, branch activities, snippets of interest, technical items etc, please send to Simon ZL1SWW <zl1sww@nzart.org.nz> or *Call Book* addresses. (I also accept large picture files sent via email).



Screenshot of AKL TV2 Vision Carrier.

AREC – Amateaur Radio Emergency Communications

Geoff Gillman ZL3QR and Bev Gillman ZL3OV

AREC Mission Statement:
To be the preferred provider of Emergency Communications to New Zealand Emergency Services.

Hi everyone.

Another year is slipping quietly by, fortunately without the trauma of some previous ones. However, a trip up the street in any town close to Christchurch has many reminders of recent happenings. Buildings fenced off, either demolished or yet to be, but very little indication yet of what is to replace them. One can only hope that the next year will show some progress on this. Meanwhile, with the Festive Season fast approaching, we want to wish you all a safe and happy time. Cheers.

Silverpeaks Search

Dunedin SAR pager activated at 1530 hr. Saturday 16 June 2012, following a report to the Dunedin Police by a group of well-equipped day trampers in the "Silverpeaks Area" of their concerns for a lone tramper who was not equipped for the conditions.

As a result, a search was mounted for the 24 year old male, who had medical issues, and who had indicated he was going to walk to Christchurch via the back country, beginning with the Silverpeaks, west of Dunedin, which were covered in snow. (Country very similar to the Tararuas near Wellington). He had begun his journey at around midday when the day trampers encountered him. Air temperature at sea level was 6°C, ambient air temperature at altitude -3° with a 7 knot wind. Seven teams in total dispatched, some by chopper, most by road into the search area for quick search of main tracks before daylight faded. The Civil Defence "Emergency Communications Unit" (ECU) was dispatched to a local hill top (in snow) as a forward communications base monitoring the VHF channels in use and the SAR HF frequencies. Also as a potential respite base for the search teams and as a "containment" point for that particular track access.

The male was "well equipped:" with a small tent, 2 x Bourbon RTD's and a chocolate bar!

A complicating factor was that there was also a "Warrant to Arrest" (WTA) in force for this individual, for a minor matter and there was a suspicion that he may try to avoid being seen and perhaps not want to be found!

Given the weather conditions it was considered that he would not survive a night in the open country, and as such there was some urgency in locating this fellow. Communications were established via the Civil Defence fixed (ESB) VHF repeater on Swampy Summit (part of the Silverpeaks). VHF radio coverage is adequate on the ridges and tops but "very poor to non-existent" in the valleys and gullies, so HF radio (Polsar) was issued to all search teams with the main HF terminal being the ECU, with ZL4FM able to monitor from his home QTH. (HF radio is not an option at the Dunedin Central Police Station).

At approximately 1700 hr, just as the light was fading, a very cold and wet young man knocked on the door of a remote farm house near Waitati (just north of the Silverpeaks) explaining he was lost. The farmer gave him shelter and warmth and dried him out, then contacted the Police. The Dunedin police went and collected him and gave him a ride in a nice modern car to the Dunedin Central Police Station, where he was given a nice warm "room" (about 8ft x 6ft) with blankets and hot food, with an appointment for the "Emergency Psych. Services" (EPS) to visit and have a chat.

All teams stood down at 1730 hr when the identity of the person was confirmed with the teams which had been inserted by chopper having to wait an extra half hour in the snow till the Rescue Helicopter returned to base and re-tasked with NVG, having passed the "Evening Civil Twilight" threshold. All parties returned to base with all stores returned and refurbished and all staff released by 1830hr.

Members involved: ZL4AE, ZL4JH & ZL4OC, Dunedin Base Operations, with ZL4RC & ZL4LDS staffing the forward comms operations in the ECU. (ZL4FM & ZL4TAE on Standby)

AREC in Dunedin are indebted to the City of Dunedin Civil Defence organisation for their willingness in enabling the AREC to utilise their resources at a moments notice. (Branch 30 AREC are the principal communications advisors and operators for the Civil Defence organisation in Dunedin).

Bill Olsen ZL4AE / ZK4EX

International Rally of New Zealand June 21-24

The International Rally of New Zealand was one of the most difficult I have had to setup and run. Planning started back in February where we had to refurbish all our HF links at Drury and Klondyke; all had small issues with aerials and water in coax connectors, one HF TS440 kept losing PLL lock and also has to be repaired. Two UHF crossband links were installed at ZL1BOK's residence and one installed in the VHF Group beacon hut to try and get signals from the HF UHF links back down to the Auckland waterfront. We required three HF links as we had to provide for two stage results and one safety tracking results information. Two VHF accessor units were setup to link 5675 Raglan and 560 Waipu back to HQ for general liaison and results backup if HF dropped out.

The event called for a more than normal 5 km safety tracking operators, 19 were needed for the first day which did put a large amount of pressure to find this many HF operators along with the 12 needed for starts, finishes and service parks. Accommodation was difficult to plan for as the organisers of the event were a bit slow getting the event itinerary finalised, so I could not completely plan where the operators would be on a day to day basis.

The headquarters was in the Auckland Viaduct Event Centre which is on the Wynyard wharf in the Auckland CBD, and this meant we were basically at sea level and surrounded by the inner city hills.

Only a certain amount of testing can be done as we could not get into the VEC and setup test aerial's to know how strong the signals would be from the links. By parking on the wharf close by showed that signal levels were only just acceptable but needed to be better. We had no choice to make this any better than it was. Aerials could not go on the roof of the VEC building as the shape made it impossible to access. Aerial poles had to be mounted on tripods on the decks which extended out the side of the building. The weekend of setup did not go so well as we were not told of an event on the third floor which stopped us setting up the aerials on that level. Full testing of the links did not happen until the day before the event which did not give us enough time to maximise beam headings and position in the three decks. Some links were marginal and were made worse by the

David ZL1DK and Doug ZL1TTE receiving results from both results channels.

The control room.

present of the WRC results system which arrived during the week and setting up a digital repeater in the same room we were operating from. The first day of the event showed that we were not fully quieting our main VHF accessor repeater and at times dropping out of it, it was not until the days results had finished could David ZL1DK and ZL1BOK and myself move the UHF beams around until we had a useable system. The second day of the event relied on the VHF accessors working or else we had no VHF communication to the north stages and Service Park at Whangarei.

For day three I had an STSP repeater setup over the stages in the Puhoi area just north of Auckland. This was the only VHF comms into this area and I was totally reliant on this repeater if HF communications dropped out; it worked better than expected and also being able to work it directly from HQ was a bonus.

CTCSS had been added to the most of the UHF links this year which got rid of all the nuisance triggering and I will be adding CTCSS to all other UHF links over the next year.

But for all the issues we had at base, the results flowed in from the field with few errors, we used 80 m only which held up throughout the event, although if we had operated into darkness we would have had to use the VHF links.

Thanks to all those who helped with aerial rebuilds numerous trips to the HF sites, and for all the operators who participated in the event without which we would not have an event.

Richard Gamble ZL1BNQ/ZK1EX

Activity Briefs

(A selection from Sept Oct)

21/9/2012. Southland Branch 37. SAR. Invercargill. Wanda Trak Search for 80 year old dementia sufferer. The elderly woman went missing from Calvary Hospital at 7.45pm on Friday night, but because she was wearing a WandaTrak tracking device in a pendant around her neck, she was found by AREC and Police 1.8 km away in Tweed St about 30 minutes later.

24/9/2012. North Shore Branch 29. CD Training. 400 East Coast Road, Mairangi Bay. Set up HF mobile rigs and send messages. Comms noisy, some locations unable to make contact, good exercise in setting up mobile rigs.

25/9/2012. Otago Branch 30. SAR Training. Various Forests south of Dunedin City The LandSAR Tracking Competition which was based at the Waiora Scout Camp. The competition areas were up to 50 km away from the base. Radio communications were provided to 9 teams via the ESB57, 58, 59 and 60 repeaters and HF Radio. The Dunedin City Civil Defence Emergency Communications Unit was also deployed as support in the field. Linking repeaters were used to assist with bringing the distant VHF radio communications into the base.

25/9/2012. Tauranga ECG Branch 88. SAR Training. Tauranga Park. SAR Radio VHF Training. Brian Heywood (ZL1IE) gave overview of VHF field communications, Bill Richardson (ZL1APD) demonstrated setting up portable club repeater using ESB 57. Robert Taylor ZL1RKT instructed the group on correct message handling.

26/9/2012. Auckland VHF Group Branch 66. CD support. Auckland Earthquake practice, drop cover and hold Regional station set up, Messages passed to and from our out stations also messages from other sections to be passed on to area control

26/9/2012. North Shore Branch 29. CD support. 400 East Coast Road, Mairangi Bay. CD radio checks, AREC roll call. Logged CD station reports. ZK1EBA worked ZK6E, good copy on 5320 kHz USB.

26/9/2012. Otago Branch 30. CD Training. Dunedin City Civil Defence HQ. A gathering of the various managers for the Civil Defence Shake Out National Earthquake Drill. At the conclusion of the Drill they broke out into groups to discuss how they would respond to a Civil Defence emergency such as an earthquake. After several hours everyone joined together to share the outcome of these discussions.

26/9/2012. Rotorua Branch 33. CD Training. Rotorua District. Shake Out New Zealand National Earthquake Exercise. 6.8 scale earthquake 20-25 miles deep Lake Rotoma – Rotoiti area. Hydrothermal activity, tsunami type waves 600 mm to 1 m high.

26/9/2012. Auckland Branch 02. CD Support. Nationwide CD National Shake-out National preparedness test of all systems and support systems in case of a disaster. Activate the communication channels for our club and test our comms plan. (A number of other Sections were also involved in this nation-wide exercise.)

29/9/2012. Auckland VHF Group Branch 66. Sports & Training. Onehunga. Communications for Auckland Heritage walks Onehunga walk. 3 groups of walkers, radio operators with each group. Control station in communication bus, and one operator at end of walk.

29/9/2012. Westland Branch 49. SAR. Kokiri. 11 yr old boy missing from Kokiri Lodge. Base set up at Lodge, comms ESX53 to 3 teams to with dogs. MP found at 0455 hr, cold and hungry but otherwise OK, Note that Search went through change to daylight saving time.

29/9/2012. Westland Branch 49. SAR Training. Bullock Creek, Punakaiki Cave Sarex. 3 overdue cavers, base set up near cave entrance, comms ESX53 to cave entrance, Michie and Hey phones into caves. Missing party found, stretcher team and rigging teams sent in, exercise ended at 1700 hr, all to exit cave.

30/9/2012. Southland Branch 37. Sports & Training. Wallacetown Gala Day. Had the AREC truck on display next to other Emergency Services.

6/10/2012. Tauranga ECG Branch 88. SAR. Kaimai Scout Hut. Two hunters reported missing in the upper Kaimai area east of Tauranga. Hunters made cell phone call to request help as they had no idea if they were on Tauranga or Waikato side of Kaimai range One SAR team despatched, communications setup at Greerton Police Station. Lost party contacted Police to say they had found a four wheel drive track that was heading down hill, and spotted the main Hamilton to Tauranga highway.

20/10/12. North Canterbury Branch 68. Sports & Training. Waiau, North Canterbury. Half Marathon plus 10 km Run/Walk. Supplied comms.

21/10/2012. Otago Branch 30. SAR. Mt Allan, west of Dunedin City. Search for a 31 year old male hunter who went missing while pig hunting in the Taieri Gorge area of Mt Allan. Radio communications were provided between search teams and search base at the Dunedin Central Police Station. The ESB58 portable repeater was setup on Mt Hyde. The teams were issued with hand held VHF radios, Floppy Jim antennas and POLSAR HF radios as a secondary channel. Radios were also provided to 4WD teams and the water rescue squad whom rafted the Taieri River. The missing person was located safe and well approx 24 hours into the search.

27/10/2012. Hamilton Branch 12. Sports & Training. Waikato River between Taupiri and Cambridge. Safety communications for the Bridge to Bridge Water Ski Racing. Very successful communications over the two days of the event. 6675 STSP used for all communications.

28/10/2012. North Canterbury Branch 68. Rural Fire. North Loburn. Fire in pine trees. Confirmed as permitted burn, Forestry unit stood down while en route. AREC provided Comms/Logistics for Forestry unit.

Conclusion

Thanks to those who have contributed to this issue and also throughout the year. Material for the next one to please be in our hands by 3rd January 2013. Photos, if included. preferably on a separate CD (with captions) mailed directly to us. E-mail pix may be acceptable but will be at the Editor's discretion and must not be embedded in the text. Contact details: <zl3qr@nzart.org.nz> or <zl3ov@nzart.org.nz> or post to 6 Boyd Street, Rangiora 7400, or phone (03) 313 7137.

(NB. Articles to please be in doc. rtf or txt format. Publisher or pdf we cannot use. Thanks.)

Reminder

As there is not usually a Section Leaders Net in December, the next one should be 21 January 2013, 3900 kHz USB at 2030 hr NZDT unless notified otherwise.

Until next issue,

73, *Geoff ZL3QR & Bev ZL3OV.*

Monitoring Service

Monitoring Service Co-ordinator: John Martin ZL1GWE
<john.martin@nz1.ibm.com>

Greetings to all, including Short Wave Listeners and contributors. By the time, this arrives, the festive season, will be upon us. So let me wish you all a safe and successful festive season. The sudden appearance of the Radio Free Asia (RFA) broadcast station on 21 450 kHz, 3rd November 2012, should remind us that we have to keep our wits about us. Its heavy transmitter footprint and associated jammer clearly resided within the 15 metre primary spectrum allocation. Even the HFCC and EIBI public HF station schedules indicated their intent between 0300z and 0600z daily. International assistance via the World Radio Conference in Ho Chi Minh, Vietnam. ARRL, NZART and IARU Region 1 has been tremendous as well as support from the Radio Sector here in New Zealand. It is really important that we maintain a keen vigilance on the frequency spectrum allocated within Region 3, this really is a privilege and only through goodwill and sustained reporting of intruders, will we ensure we do our best to protect it for the rest of the community.

During the month of November, I must admit I did slip in my duties momentarily, to take part in the IBM QSO Party for 24 hours using CW, SSB and to participate in the Straight Key Night. What is happening with 10 m, 28 – 29.7 MHz these days? When we have peaks in the Solar Flux, propagation soars and every non-amateur signal appears to invade 10 m. Region 1 has been complaining of Brazilian CBers, Russian Taxi Controllers and within Region 3 we have a combination of Indonesian and Chinese intruders? So whose primary allocated spectrum does 10 m belong too? Legitimate Radio Amateurs or the intruders? The term "Use it or lose it' comes to mind. We are losing that battle right now, it appears. Other harmful interference sources include Over The Horizon Radar (OTHR) and the HF Man Packs.

This is a screenshot; indicating the number of A3E/F3E non-amateur transmissions, which are mainly Chinese or Indonesian stations with their squelches on a particularly good day when propagation is good. They certainly look as though they are enjoying occupying 10 m, with total disregard to other users of the spectrum.

It is also that time of year, when we award the NZART Top Intruder System Observer Award for 2012. Well, believe it or not ZL1TZE has done it again! He wins a free full membership to NZART for 2013. Thank you, Philip for your continuous contribution to the Monitoring System and the amateur community, it is really appreciated.

Intruder System Observer League Table 2012 (up to end of October 2012)

Contributor Name/ Call-sign	Number of verified reports
John ZL1GWE	865
Bob ZL1BAD	285
Stephen ZL1TPH	131
Phillip ZL2TZE	55
Brett, ex VR2BG/P	37
Gary ZL2iFB	6
Rex ZL4IV	4
David ZL1DGK	3
Dallas NZRDXL	2
Bill ZL3NB	1
ZL2AAA	1
Others	0

Please report intruders to: <MS@NZART.org.nz> or <MS2@NZART.org.nz> or <IntruderWatch@GoogleGroups.com> or to your favourite DX Cluster.

Remember, it is important, that you announce your call sign, at least every 10 minutes in accordance with the General User Radio Licence (GURL) conditions; even if you are operating a Hang Glider on 2 m! Amateur Radio is a privilege. I wish you and your families a very Merry Christmas and a very safe Happy New Year. Meanwhile, we will keep on chasing Intruders and harmful interference in our allocated frequency spectrum. If you have any questions, do not hesitate to contact me directly.

John (ZL1GWE)

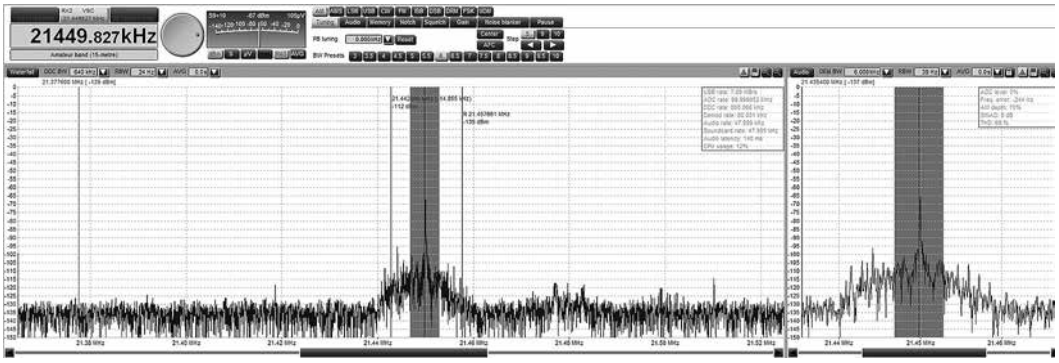


Figure 1: RFA broadcasting within the 15 metre band, A3E transmission; note the signal meter strength.

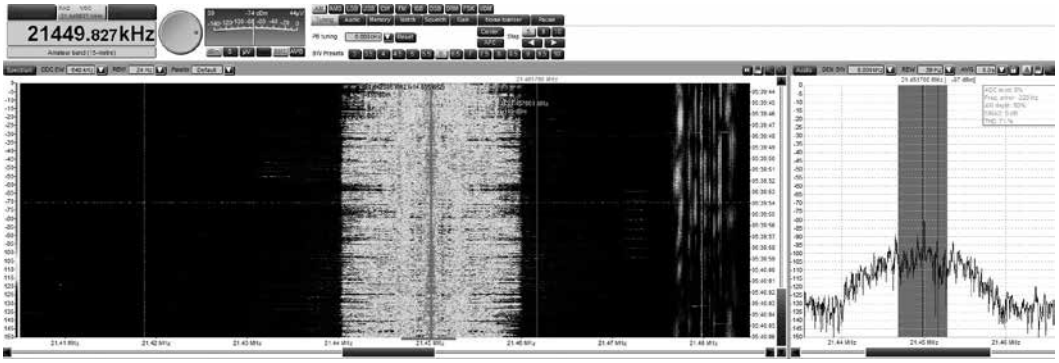


Figure 2: Spectrum analyser view of the bandwidth occupied by RFA.

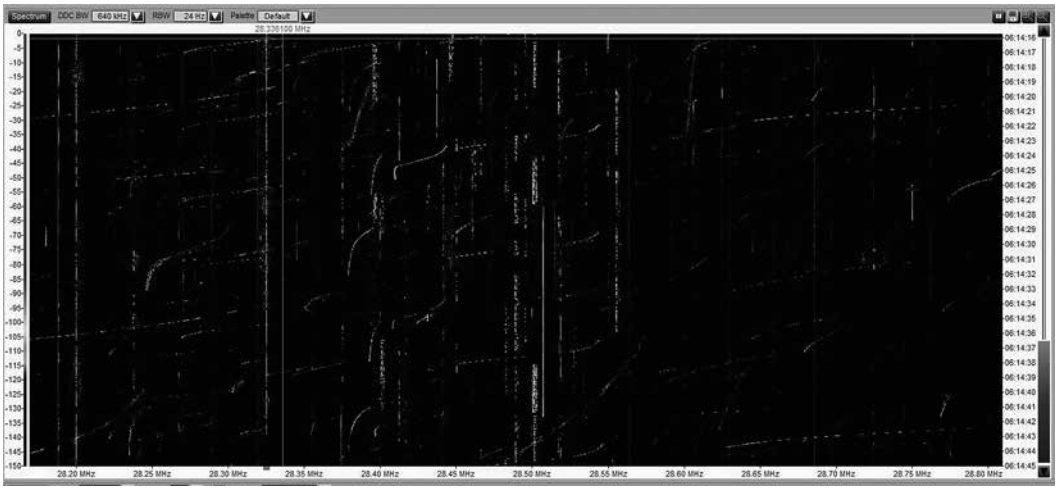


Figure 3: The state of 10 metres on 21st October 2012.

Contests

Contest Manager: Frank Hunt ZL2BR
<2bfrank@orcon.net.nz>

Jock White Memorial Field Day Contest

When: Saturday and Sunday February 23 and 24 2013.

Times: (NZDT): 1500 to 2400 Saturday then 0600 to 1500 Sunday

Rules: For the latest version please see: <http://www.nzart.org.nz/activities/contest-rules/rules-jock-white-field-day/>, Team leaders must be familiar with the rules as on the NZART web site.

Note that the rules are currently undergoing a re-write to remove some excess wordiness however there will be actual changes to the rules as such.

Aims and Objectives

For NZART Club Branches to establish effective temporary HF radio stations, to work as many other stations as possible and to learn to operate in an abnormal situation in less than optimal conditions.

Home stations can also operate in the contest but are strongly encouraged to make a minimum of either 50 phone or 25 CW contacts on 80 m and/or 40 m and submit logs. And of course to have fun! Why not combine the event with a club BBQ / Picnic?

Bands, Modes and Power

40 and/or 80 metres, phone (SSB) and/or CW, 100 watts maximum. Stations using two transmitters may operate simultaneously on both bands, however only one transmitter may be operated any one band at any one time. Single transmitter stations may operate on one or both bands.

Sections Categories:

Single Operator; unassisted by any other person.

- CW only; single band or two bands
- Phone only; single band or two bands
- 80 m only
- Single-transmitter station 40 m and 80 m
- QRP; 5 watts maximum (WM Hall Memorial Cup)
- Home stations
- Overseas stations in the South Pacific area

Logs

This has been a controversial area for some. In 2013 log submission will remain paper based. Teams are entirely able to log using PC based software, but the log set to the manager must be on paper. Why? About 2/3 of logs received are still pen and paper based. The time may come where we make the event all electronic, however if this were to be enforced now I sincerely believe it would result in a drastic fall in activity. Surely it is not much extra work to print your logs and post them, fairly easy in comparison to setting up and operating a field station for 18 hours!

Branch Number

If you intend to operate with a branch number that is not that of your 'home' branch, please check the branch number section of the rules carefully. If you need any help or clarification please contact me at my e-mail address below.

I am looking forward to hearing you on, I will be active as part of the Marlborough, ZL2KS team.

Stuart Watchman ZL2TW
Manager
<clareandstuart@xtra.co.nz>

Sangster Shield 2012 Results

An apology from the Manager.

Since publishing the results in the October/ November *Break-In* and on the NZART Contests web page an entrant has contacted me and pointed out that I had allocated a branch count of 12 to 2 entrants but recorded a total of only 12 active branches. As we all know the maximum claim is always one less than the total since entrants may not claim their own branch.

I have carefully reviewed all logs and discovered that the 2 entrants concerned should both have been credited with 11 branches and not 12. The details I had overlooked were one claim for a non existent Branch 86 and the other for a low activity Branch 02 contact which I had not consistently deducted from all claimants.

This error is a basic one that I should have noticed long before publication. The changes mean that Bill ZL3VZ moves into 1st place for 2012 and Sid ZL2BIF becomes 2nd equal with Barry Zl2LN. Other awards are unaffected.

For the record I have submitted a fresh spreadsheet to record all of the changed positions.

Once again apologies to Sid and all contestants who deserve better accuracy.

73's *Glenn ZL2KZ*

Sangster Shield Amended Results 2012

Sangster Shield – Open Section

Place	Station	Name	O-5 W	6 W+	DX	Bchs	Pwr	Total	Branch	Equipment
1*	ZL3VZ	Bill Cousins	130	0	3	11	5 W	7480	22	Icom IC-706, 80m C/F Dipole
2=	ZL2BIF	Sid McKain	123	0	2	11	5 W	6985	72	Kenwood 820, Sky Wire Loop, Ladder line
2=*	ZL2LN	Barry Davenport	123	0	2	11	5 W	6985	24	Yaesu FT847, 80/40 Trapped Dipole
4	ZL2AGY	Tony Marr	119	0	0	11	5 W	6545	87	Elecraft K3, Inv V 10m up O/W fed. TR4W Log
5	ZL1AIH	Ken McCormack	95	0	2	11	5 W	5445	29	Elecraft K2, 80m 1/4w vertical
6	ZL2AOH	Ralph Sutton	96	0	1	11	5 W	5390	50	Kenwood TS-120-V. Dipole
7	ZL2AEL	Tony Locke	93	0	0	11	5 W	5115	69	Kenwood TS-570D, 5 Band Hygain Vertical
8	ZL1BWG	Bruce Scahill	91	0	0	11	5 W	5005	28	K'wd 120V, G5RV, Marconi Admiralty Key
9	ZL2KZ	Glenn Kingston	69	0	1	10	5 W	3550	50	H/Brew valve xcvr, BLY87A final, 1/2w dipole
10	ZL2AQL	Mike Spearman	75	0	0	9	5 W	3375	88	Yaesu FT101Z, FTC-902 Tuner, Dipole Ant.
11	ZL2BHD	Graeme Bateman	67	0	0	10	5 W	3350	87	Yaesu FT7B. 80m Horizontal Loop
12	ZL2ALJ	Tony Fletcher	50	0	1	10	5 W	2600	50	TS120S, End Fed 130' Wire Antenna
13	ZL2JU	Les Jury	41	0	0	10	5 W	2050	16	Elecraft K3. Emtron tuner, 80m o/w fed Dipole
14*	ZL4IM	John Norton	37	0	0	9	5 W	1665	8	TS850s. 2 half waves in phase 80' up.
15	ZL2BIT	Joe Willan	18	0	0	9	5 W	810	27	Not advised
16	ZL2AKW	Trevor King	19	0	0	6	5 W	570	50	JRCNSD-515

Transistor Trophy (Opr licensed less than 1 year)

None this year

Arthur Stevens South Island Trophy

1	ZL3VZ	Bill Cousins	130	0	3	11	5 W	7480	22	Icom IC-706, 80m C/F Dipole
2	ZL2LN	Barry Davenport	123	0	2	11	5 W	6985	24	Yaesu FT847, 80/40 Trapped Dipole
3	ZL4IM	John Norton	37	0	0	9	5 W	1665	8	TS850s. 2 half waves in phase 80' up.

* Arthur Stevens entrants are also valid entrants to the open section above

Old Timers' Club

Stephen Hayman ZL1TPH
<zl1tph@nzart.org.nz>

From the Desk of the "GRAND OLD MAN"

Greetings fellow OMs. With the advent of the festive season rapidly approaching, I thought it fitting to write a few lines to our members and listeners and include an update following the AGM last June.

Roy Symon resigned as Secretary of O.T.C. and also relinquished his role of O.T.C. Scribe for *Break-In*. These two positions have been filled by Barry Stewart ZL2RR (Secretary) and Stephen Hayman ZL1TPH now has the responsibility of Scribe. The transition period for Barry and Stephen has gone very smooth and Roy ZL2KH must be thanked for his experience and knowledge which he continues to share when called upon.

Our Monday night net on 3.870 MHz at 8.30 pm, continues to flourish with usually around 15 stations participating.

OTC encourages new members and the only requirement is that you must have held a Ham Licence for 25 Years. Application forms are available from the Secretary, Barry Stewart ZL2RR (*Call Book* Address) and a one off fee of $10 applies.

In closing, I wish to extend my personal fraternal greetings to you all for the Christmas and New Year festivities. I trust you will have plenty of time to spend with family and friends with an 807 or two, I wish you safe travel and look forward to working with you all in the New Year. Keep a hopeful eye out for a new rig which may arrive in your Santa Sack. Hi.

My wish for next year is to see a great turnout of OTC members at the AGM in Masterton. In the meantime, I wish you all many 73

Ivan Horn ZL2ATU,
Grand Old Man OTC(ZL)

Old Timers' Club-OTC (ZL)

- To recognise service to Amateur Radio;
- To revive and maintain interests and good fellowship among the older members in the common cause;
- To offer advice and encouragement to newer Amateurs;
- The Club is affiliated to the New Zealand Association of Radio Transmitters (Inc.)

Grand Old Man
Ivan Horn ZL2ATU
P.O. Box 7250 Wanganui
E-Mail <loobie@kol.co.nz>

Secretary/ Treasurer
Barry Stewart ZL2RR
1 Caversham Road,
Westmere,
Wanganui 4501
E-Mail <ZL2RR@xtra.co.nz>
Phone: 06 345 4152

Monday Evening SSB Net
Net details: 2030 hr (local time) each Monday on 3.870 MHz LSB.

Sunday morning AM Net
Net details: Sunday morning at 10.30 am on 3.850 MHz.

SSB Net Controllers
Roy Symon ZL2KH
Don Dalrymple ZL3SZ
Stuart Watchman ZL2TW
Pete Moore ZL2AUB
Ivan Horn ZL2ATU

AM Net Controller
Doug Alexander ZL2AWF
District Representatives
ZL1: Stephen Miller ZL1FS
ZL2: Stuart Watchman ZL2TW
ZL3: Don Dalrymple ZL3SZ
ZL4: Peter Anderson ZL1LR

New Members

ZL2BGE Leo Boyle, Wanganui – OTC 1287

Silent Keys

Nil

Certificates sent out

893, 50 Year Certificate: ZL2FM, Errol Burr, Gisborne

From the OTC scribe

The NZART QSL Bureau operates a service of handling incoming QSL cards received from overseas, as well as for outgoing cards and is of valued service. Barry Stewart ZL2RR *(our OTC Secretary/ Treasurer)* is the NZART QSL manager, along with the QSL sub-managers, ZL1BGB, ZL2AGY, ZL4HU and ZL4OZ whom represent the four districts.

OTC member Ross Glover ZL1BGB reports, "With the passing of Jack Small ZL1KQ in August 2008 the ZL1 Sub Bureau was moved to Branch 86 Musick Point, Ross ZL1BGB and David ZL1DAM took over the operation, with Ross doing the card sorting and David being responsible for data entry to the computer. We have a problem, when you shift QTH out of town. If you don't tell us at Branch 86, your new Branch number, then in time your cards will get dumped. To those who supply self-addressed, stamped envelopes or funds as Credit, thank you!

Ross ZL1BGB at Musick Point ZL1 QSL Bureau.

A photo is included of Ross ZL1BGB at the Musick Point ZL1 Sub Bureau showing the layout of the office. Many thanks Ross, along with your team members, and this recognises a valued service to Amateur Radio.

New Membership from the Secretary/ Treasurer

The OTC has received a couple of welcome donations during the past three months but still it is sadly lacking in the enrolment of new members. There are many ZL amateur operators who qualify, but see no need to apply, for membership. A one-off fee of ten dollars gives one life membership of the club with no other demands being made upon you during that that time: a real bargain in this modern world of ours!

73 *Barry ZL2RR*

OTC news around the Branches

OTC Members of Branch 50, Wellington, took out the Branch Award in the 2012 Sangster Shield Contest. Those entrants were ZL2AOH Ralph Sutton, ZL2KZ Glenn Kingston, ZL2ALJ, Tony Fletcher and ZL2AKW, Trevor King, Congratulations!

Wellington OTC Members meet every fourth Tuesday of the month at the Lutheran Church Hall in King Street, Wellington.

73 *de Trevor ZL2AKW OTC 363*

Lee ZL2AL, circa, 1961 as VE3OE in Toronto

Well, here is a touch of early VHF nostalgia with Aurora Borealis *(Northern lights)* propagation work with the 2 metre station shown; 50 plus years ago; this would have been considered leading edge technology at the time and comparable in performance to many VHF DX stations evident today.

Lee ZL2AL reports, "The gear for HF then was a Collins 75A4 and an EF Johnson Ranger transmitter and Matchbox. I was into RTTY those days in a big way. The printer was a Teletype Corporation model 26 and as I was an Engineer with IBM Canada at that time, my QSOs were recorded on a card and time stamped. The home brew rack panel was for 2 m Aurora Borealis work and consisted of a pair of 4CX250Bs running 500 Watts into a pair of 12-element 2 m Yagis. The 2 m converter at the top of the panel used a very low noise and very rare and expensive 417A tube. Canadian 2m ops used to point our Yagis north into the aurora and the CW signals would bounce off and go south into the USA. The aurora process would turn the pure CW notes into raspy buzz saw sounds which still could be received a few thousand miles away.

Monday evening on air OTC net

The ZL6OTC "On Air" net details are 2030 hr (local time) each

Lee ZL2AL, circa, 1961 as VE3OE in Toronto.

Monday evening on 3.870 MHz LSB and all are welcome to check-in and say hello. On that note, and to encourage others to do so *(including myself)* here is a brief report of the activity over the last two months;

The 10th of September 2012 had many members check-in; Roy ZL2KH ran the net as ZL6OTC and was joined by Arthur ZL3GE, John ZL1BDY, Roy ZL1LK, Barry ZL1AVW, Barry ZL2RR, John ZL2TCA, Joe ZL2JM, Gareth ZL3VP, George ZL3PN, Don ZL3SZ, Maurice ZL3MEM and Mike ZL1BNB.

Lively discussion took place on the phasing out of analogue TV and the introduction of digital transmission on the West Coast and Hawkes Bay shortly. A number of members mentioned that they are looking forward to operate on 6 m as soon as the geographic restrictions on this band are removed.

Don ZL3SZ reported seeing the steam train excursion to Arthurs Pass and commented on the high price of tickets for the TransAlpine excursion to Greymouth. Gareth ZL3VP mentioned that his mobile home shack is currently back home in Chch and that the Motor Home Club is having to move to a new location as their old buildings had sunk 20 cm and were in the red zone of Christchurch. John ZL1BDY reminded members to support our OTC editor with copy for *Break-In*.

Reported on the 17th of September; the net was run by Don ZL3SZ in CHCH operating as ZL6OTC. Check-ins included John ZL1BDY, Barry ZL1AVW, Roy ZL1LK, Ivan ZL2ATU, Roy ZL2KH, Barry ZL2RR, Ian ZL1AF, Mike ZL1BNB, Arthur ZL3GE, Stuart ZL2TW, Martyn ZL3CK/p and Joe ZL2JM; all stations were copied although there were lots of static crashes from the cold front travelling up the country. Arthur and Don reported seeing the black clouds moving from the south with 116 km winds and heavy rain. Roy ZL1LK was using an old all valve transceiver FT200 which put out a good strong signal. Unfortunately the clarifier was turned on so he transmitted about 700 Hz too high.

The 25th of September, Ivan ZL2ATU *(The GOM)* ran the net and was joined by John ZL1BDY, Roy ZL1LK, Barry ZL1AVW, Mike ZL1BNB, Barry ZL2RR, John ZL2TCA, Joe ZL2JM and Don ZL3SZ. There was no official news but it was interesting to hear Don ZL3SZ talking about his preparations for the "Frequency Measuring Contest" next week end. In readiness he had serviced his 70 year old BC221 military frequency counter and also an old LM10 unit. But for serious work he bought a new commercial digital unit displaying to the nearest hertz. Comparison with WWV showed it had an error of 13 Hz which has not changed from the day he purchased it.

Monday the 1st of October, saw Roy ZL2KH fire up his transmitter and later abandoned the net because of poor propagation conditions.

However last night, 8th October, the band was good and there was a large turnout! Roy ZL2KH ran the net as ZL6OTC and was joined by Roy ZL1LK, Ivan ZL2ATU, Barry ZL1AVW, Don ZL3SZ, John ZL1BDY, Ian ZL1AF, John ZL2TCA, John ZL1BEY, Maurice ZL3MEM, Joe ZL2JM and Barry ZL2RR.

There was a bit of confusion because of the "too many John's" on tonight net were with similar call signs. Both ZL2KH and ZL3SZ had panel repairs to their cars following accidents. The South Island stations reported very cold weather with snow low on the hills. Don ZL3SZ reported that all his high tech frequency measuring equipment was defeated by poor propagation and noisy signals during the frequency measuring contest.

One member reported seeing a very good DVD at a branch meeting on the role of WAAF officers in flying new aircraft from the manufacturer out to operational airfields during WW2. One of the women pilots flew solo 76 different types of aircraft including Spitfires and Lancaster bombers. A magnificent achievement!

On the 15th October the ZL6OTC net was run by Ivan ZL2ATU and was joined by Earl ZL1AKL, Roy ZL1LK, John ZL1BDY, Barry ZLAVW, Stuart ZL2TW, Joe ZL2JM, George ZL3PN, Arthur ZL3GE, and Don ZL3SZ. Quite a lot of discussion was held on the Kenwood TS520/820/530 series of transceivers which were owned and used by many on the net. These are very old rigs with tube finals but are still giving good results because they are easy to service. They are however not as frequency stable as the more modern rigs. Don ZL3SZ said that his planned trip to Arthurs Pass was cancelled because of road closures due to 2 foot of snow and fallen trees so he went to the beach instead.

Monday the 22nd, the net was run by Don ZL3SZ operating as ZL6OTC and he was joined by John ZL1BDY, Barry ZL1AVW, Roy ZL1LK, Ivan ZL2ATU, George ZL3PN, John ZL2TCA, Stuart ZL2TW, Roy ZL2KH, Earl ZL1AKL, Joe ZL2JM, Barry ZL2RR and Gareth ZL3VP portable near Kaikoura.

Roy ZL1LK in Auckland mentioned that his whip antenna on the roof had been hit 3 times by lightning in 5 minutes and that it had evaporated the centre core of his coax. Fortunately no radio equipment was connected and the only damage was to a power supply where the spark had jumped across from the coax to a power cable. Other members recalled trees on farms being split from top to roots by the steam generated by the energy of the strike. Stuart ZL2TW mentioned how commercial hilltop repeater sites often show blackened stains from the antenna cable being burned by strikes.

Ivan ZL2ATU introduced a visitor from Singapore who spoke about her New Zealand trip. Don ZL3SZ declined an invitation to stay at Otira because he recalled being eaten alive by sand flies on his last visit. Stuart ZL2TW mentioned that his mobile FT857 rig had developed an internal crackling noise which Joe ZL2JM suggested may be caused by failure of the ceramic filters.

Acknowledgements

Many thanks go to the contributors who help make this column happen with their input: ZL1BGB, ZL1BDY, ZL2AKW, ZL2AL, ZL2ATU, ZL2RR, and many others.

Summary

The OTC column in *Break-In* is a forum for members to publish a letter, or an article. OTC readers, along with association members, will all enjoy reading and hearing about other radio amateurs experiences, both past and current.

Contributions can be technical, an account of first involvement with early amateur radio, nostalgia, along with vintage radio which all provides an invaluable source of information on the history of their hobby.

The "Old Timers' Club" was essentially a social organisation, and that is still current today.

Articles relating to all aspects of OTC, are most welcome, and to be addressed to: Stephen Hayman, ZL1TPH; Postal address, 68 Kath Hopper Drive, Orewa, 0931 or via email to <zl1tph@nzart.org.nz> We also accept large picture files sent via email and will transcribe hand written letters to text.

73 *Stephen ZL1TPH*

Answers to crossword No.19 p22

Across: 1 rad, 3 Bethlehem, 8 circuits, 9 totara, 11 inch, 13 temperature, 16 exciters, 17 neon, 19 iwi, 21 Ni, 22 square, 24 sicken, 26 transmit, 27 Psalms, Down: 1 rectifier, 2 direct, 4 emit, 5 hysteresis, 6 huia, 7 mirage, 10 Titanic, 12 helical, 14 presents, 15 Rhone, 18 ninety, 20 Wilno, 23 QTHs, 25 Kim.

DX Downunder

Graeme Hunt ZL1ANH and ZL1T
<graemeh@xtra.co.nz>

Conditions over the last two months have improved with some good openings on the higher bands and the solar flux index (SFI) has been over 150. DXpeditions to Chad TT8TT, Rodriquez Is 3B9SP, Western Kiribati T30PY Conway Reef 3D2C and an operator on Gough Island ZD9UW, were some of the highlights. Campbell Is and St Peter and Paul Rocks should also have been on the air in the last month.

I am writing this just after the CQWW SSB contest in the last weekend of October. Although the SFI was around 120 we were treated to amazing conditions on 10 m, particularly to Asia and the Americas. On 40 m and 20 m several Europeans told me my signal was 20 dB over 9, however because of QRM it was still difficult to work that area. I have never experienced contest operation from Europe, but appreciate how fortunate we are in ZL not to have hosts of adjacent stations all running high power. It was interesting to work C5A in The Gambia at 1550z (around 3 am in New Zealand) on a bearing of around 320°.

French dependencies and former coloniest

There seems to be a delightful randomness in the issuing of their latest call-signs like TO5, TX2 etc. They may be in the Indian Ocean, Caribbean or Africa.

From <www.turkkonferans.org/> the following is supplied with no guarantee of accuracy.

TO, TP, TQ, TVA-TXZ, TV, TW France
TO France (Outside France – Departements d'outre-mer)
TO0 Saint Pierre and Miquelon Islands
TO2 Martinique
TO4 Europa Island
TO5A Guadeloupe
TO5M, TO5TMartinique
TO8 French Polynesia
TO9 French Guiana
TP France (Council of Europe, Strasbourg)
TX France (Outside France – Territoires d'outre-mer)
TX0 Chesterfield Island
TX8 New Caledonia
TX9 Chesterfield Island

Not included above is TX5EG which is on Leeward Island which counts as French Polynesia, while both TO2M and TO7BC, the 2013 DXpedition, are on Mayotte Island in the Indian Ocean. In the CQWW contest TO9R was operating from Martinique. If anyone has managed to decipher the call-sign allocation system I'd be glad to publish it in the next issue.

It are raining not in Tokyo

Spare a thought for the majority of hams on our bands who do not have English as their first language. In ZL we only had to study electronics and radio regulations, no CW these days. However if you are coming on the HF bands from Tokyo, Timbuktu or Turkmenistan, you're going to have to learn a little English first. It is the accepted language on the bands and so we are lucky to get at least "My name is Alex and QTH Moscow"; how's your Russian?

For more "raining not in Tokyo", and a real laugh at our hobby, go to *YouTube, Hancock, Radio Ham.*

Kosovo made its first and surprising appearance in September as Z60K. Although it declared its independence in 1990 and again in 2008, there has never been any ham activity as Kosovo, in fact there isn't even a prefix allocated by the ITU. Even North Korea has the P5A-P9Z ITU allocation, it just doesn't permit amateur radio. The United Nations partially recognises Kosovo, whatever that means, but it looks like it may still be part of Serbia.

Bill NC1L of ARRL Awards branch sent the following "Congratulations to the team which helped to reintroduce Amateur Radio to Kosovo, and welcome back to the airwaves to the returning Hams.

As of this time Z6ØK, and/or any other Z6 station, will not count for any entity for DXCC awards purposes as they do not qualify under the DXCC rules. Any future change in Kosovo's DXCC status will be announced by ARRL."

"No dear, you don't want to come with us on the Martinique DXpedition – it's just boring old radio stuff."

Working the Pile Up

New Zealand is fortunate to be a fairly rare country and if you put any sort of decent signal into a major population area like Europe, Asia or North America you may find yourself at the good end of a pile up. This is when you are inundated by calling stations. It's up to you whether you select one caller and have a long QSO, or try and put as many callers in your log while the band is open. If you decide to answer the whole mob, I've found the following useful:

1. You run the pile-up, callers do what you say, or never get in your log.
2. Pile ups are when there are so many callers it can sound just like mush on SSB, I'm talking of scores if not hundreds calling, not just a few – and they are calling for a long time.
3. You have the options of splitting the frequency. Check above your frequency to see you won't be interfering with other QSOs already in progress. Tell the callers you are listening up, or up 5 to 10kHz (PH) or UP on CW. Don't specify an exact frequency or your pile up will all move there, you want them to spread a bit.
4. Another option is to tell callers to call by number; all the 1 area calls, then 2s etc, or by geographic area,
5. Occasionally ask for different continents; for example in a European pile-up, ask Europe to stand by and for only Africa to call; you'll be amazed who is beneath the pile up.
6. You are using computer logging, aren't you? Even if you aren't, have a separate pad and pen, as they call, select one caller, don't answer yet, and maybe you only got part of his call like A6F. Others will continue to call; write down some of their call fragments on your pad, E7S, K5AUT, 4L etc. Only then go to the original caller and work him "Station A6F go ahead "JA6FGT is then worked. Now here's the good part; "Station with E7S go ahead", VE7SD is then worked and so on. The good thing is you have reduced the amount of times you are trying to pick call-signs out of the shambles that is your pile-up by 75% and you don't have a repeat of endless calling after each station is logged. This should get your logging up to 3 a minute or better.
7. When you are asking for a specific call number or area, without doubt you'll get those that don't listen. For example, you are asking for outside Europe and I9XYZ calls. Last time I looked, Italy was still part of Europe. Here's what I do. Write his call down but ignore him. Don't waste time telling him not to call, he's in Europe, etc. Later when I'm back working the Europe pile-up I'll call for I9XYZ. Never acknowledge or work someone that calls at the wrong time, you'll open the floodgates.
8. On CW use your RX RF gain, or attenuator, the weaker signals disappear, work the strong ones then turn the gain back up/attenuator off. On SSB this doesn't seem to help so much, but narrowing the receive passband is useful.
9. See Rule 1.

Changes to Prefixes

Tokelau now E6,
South Sudan Z8.

QSL Bureau

by Barry Stewart ZL2RR
<zl2rr@xtra.co.nz>

Greetings from Wanganui! The end is nigh for this year of 2012 so once again my annual December reminder follows: The time had arrived for the annual clearing of the Bureau's pigeonholes that have not seen a posting since the end of 2011. Later this month I will be having a mail-out to those small bureaux that have had insufficient cards to fill an envelope during this past year. Over the next couple of weeks please take time out to forward your QSL cards to Box 857 to catch this mail-out. This mailing will take place by the 31 December so please expedite your cards!

The outward traffic to the NZART's QSL Bureau has suffered a dramatic tailing-off over the last couple or so months after a steady flow into Box 857 during the earlier months of this year. This trend closely follows that of incoming DX cards, which after large numbers regularly arriving earlier in the year, have dramatically dropped away resulting in a very spasmodic regime for mail-outs to the four ZL Sub-bureaux over the last few months of this year. Postings are made when 5 kg of QSL Cards are on hand for either the ZL1 or ZL2 Sub-bureau; if that weight isn't made by the fifteenth of every second month, the package is posted with whatever is on hand at that time. Postings for the ZL3 and ZL4 Sub-bureaux are made when 700 g of cards fill their envelopes.

I have received a note from the Musick Point Radio Group, Br 86 NZART.

It states that Ross ZL1BGB and David ZL1DAM spend many hours in the ZL1 QSL Bureau and doing 'homework' to give you an excellent service. Unfortunately some of you make their job rather frustrating! In recent weeks Iris, XYL of Ross has been helping in the primary and secondary sorting while David has done the final sort while referring to data he has entered on the computer.

It would be a year ago that they sent out a note with their cards to some saying they owe the ZL1 Sub Bureau! Few responded; so no postage; no cards dispatched and after a suitable period of grace, the cards were dumped. A number of Branches are in the same position so if your club has arranged a Branch posting with us and you have been working DX but not been receiving QSL Cards, now you know why! Check with your Branch Secretary as to whether or not your branch is in credit with the ZL1 Sub-bureau.

To you who thank us for the service we provide, this we appreciate!

Now for a few comments re 'Branch postings' from the NZART QSL Bureau Manager (that's me!) There is no provision for 'Branch Postings' from the NZART QSL Bureau system to any Branch of NZART.

ZL1 QSL Sub-bureau Manager Ross ZL1BGB and his part-time assistant XYL Iris.

Some Branches do have special arrangements for 'Branch postings' in place with the appropriate sub-manager but as it states on Page 3-9 of the 2012 – 2013 *Call Book* 'The possible provision of this service is totally the prerogative of each individual Sub-manager and there is no compulsion on any person to be a party to any such collective scheme.' In other words, supply your Sub-Bureau with Self Addressed Stamped Envelopes (SASEs) and your cards will be posted directly to you.

Having referred to the ZL1 QSL Sub-bureau, it is time to mention that a 5 kg posting of QSL Cards has gone astray in the mail system. Enquiries are being made at this time and we are hopeful that a satisfactory conclusion to this search soon will be reached.

We now are well into daylight saving time and some QSL cards are arriving using this time (NZDT) for the QSOs logged. Please remember to maintain UTC on your shack clock so as to keep 'correct time' for your log entries and QSLing and this will make it easier for the recipient to find you in their log.

On behalf of the NZART, I sincerely thank all those members who, from time to time, forwarded a donation towards the Bureau costs with their QSL cards; they were greatly appreciated. Our mailing costs have taken a hit with it having been twelve months of full cost air-mail postage after the scrapping of the Economy Mail rate late in 2011.

Following receipt of your January – February 2013 *Break-In* magazine, please forward the *Break-In* label with your next posting to the Bureau. Your name as an NZART member will be added to the list and will cover any other postings you make to the Bureau that year. Thank you.

Season's Greetings to all who read this column and, of course, our esteemed Editor and his *Break-In* team, I wish you all the very best for Christmas and the New Year of 2013 on behalf of Ken ZL4HU, Dave ZL4OZ, Ross ZL1BGB and Tony ZL2AGY. With the present cycle in the ascendency, may the New Year see plenty of 'good ones' being entered into in your logbook and "QSLed via the Bureau" of course!"

Finally, please remember that if you have any questions, queries (QSL manager's addresses, etc.) or comments please feel free to contact me either via mail (1 Caversham Road, Westmere, Wanganui 4501 or PO Box 857, Wanganui Mail Centre 4540), or Email: <ZL2RR@xtra.co.nz >

73, *Barry ZL2RR*

Special Call: Howard ZL1BXA now has a special call ZL1WAI which he will use only when operating from Waiheke Island, which is IOTA OC201.

DXpeditions

Some excellent holiday DX:

Caribbean; Look for K3LP for assorted Caribbean goodies:

- Dec 18-22nd – Call-sign K3LP/KP4; San Juan, Puerto Rico
- Dec 23rd – Call-sign K3LP/KP2; St. Croix, US Virgin Islands
- Dec 24th – Call-sign K3LP/V4; Basseterre, St. Kitts
- Dec 25th – Call-sign K3LP/J73; Roseau, Dominica
- Dec 26th – Call-sign K3LP/J3; St George's, Grenada
- Dec 28th – Call-sign K3LP/KP2; Charlotte Amalie, St Thomas, US Virgin Islands
- Dec 29-31st – Call-sign K3LP/KP4; San Juan, Puerto Rico

Afghanistan T6LG till February 2013.

Angola D2FJZ for 2013

Burundi maybe 9U4U, 14 to 28th Feb approx

Burundi 9U look for HA3JB, now living there. 20 m SSB and PSK31.

Clipperton Is TX5K February 28th to March

Djibouti J28NC for the next two years.

Gabon TR Sebastien, F4EIH, will be in Gabon for at least three years.

Gough Island ZD9KX for one year.

ZD9KN heard on the bands recently was a pirate.

Heard Island VK0HI proposed for 2014.

Jan Mayen JX9JKA till March 2013.

Mayotte TO7BC March 2013.

Nets

ANZA Daily: DX net at 0515z on 14183 kHz and now also Saturdays 0445z on 21205 kHz. Mondays, Fridays and Saturdays it is followed by the Pacific DX net on the same frequency from 0600z.

Arabian Net: Fridays only 0500z 14250kHz – host JY5HX and features exotic Middle East calls.

ZL DXers: Tuesdays 8pm NZ 3777 kHz

What's on the air now? <www.dxsummit.fi/DxSpots.aspx >

QSL information: <www.qrz.com>

Acknowledgements, 425 DX, OPDX Bulletin.NC1L

A Very Merry Christmas and lots of DX in 2013 to all readers, and a special thank you to all those that contributed to this column. I've arranged for Santa to leave the latest transceiver (including power supply and linear) in the stockings of those that have been very good, so enjoy; or behave better next year.

Contact me at *Call Book* address, or by email at <graemeh@xtra.co.nz>.

WARO – nz womens amateur radio operators

with Topsy ZL2LS and Ngaire ZL2UJT
<waro@nzart.org.nz>

Greetings to all members and readers of this issue of *Break-In*. This year has gone by so fast and now not long until Christmas is upon us. A great time to catch up with family and friends and WARO mates.

Articles for *Break-In* have been coming in steadily which is great to see, so thank you and keep them coming on into us. Just remember when we all head off to something take a couple of photos and write a small story and send to us, we would love to hear what others have been up to throughout the country, our email address is at the top of the page.

The WARO net is still on Monday nights on 3.695 and still remains at 8 pm in daylight saving time. Numbers vary each week and would be nice to have a few more if we can. We know that you are all busy but would be nice to have a good chat with a few more of you. YLs are also welcome to check in and have a chat with us as there are no requirements to be a WARO member. Over the holiday time some of the net controllers might not be available, so if this happens it would be nice for someone to step up and run the net for the night.

The President and the executive committee would like to take this opportunity to wish all WARO members and other readers of this column a very Merry Christmas and best wishes for 2013. Take care travelling if you are, and if you are in another district don't forget to call up and chat with the WARO ladies in that area, we are sure they would love to hear from you.

Club Information this month
Branch 29 North Shore

Three members of WARO are also members of Branch 29 of NZART North Shore. They are Rosemary ZL1RO, Marlene ZL1MYL and Marian ZL1BLI. They all enjoy taking part in Branch activities whenever possible. At a recent branch social meeting Rosemary ZL1RO and Marian ZL1BLI were part of the winning team in a wine appreciation quiz.

News from our ALARA mates

I am a VK thrive! Hi, I'm Jenny VK3WQ and VK5ANW. The term "VKthrive" (a play on three and five) was given to me by some of the ALARA ladies when I started living with my partner, Peter VK3RV, in Victoria (VK3), having spent the previous 43 years of my life living in South Australia (VK5).

As we travel back to South Australia on a regular basis, I retained my VK5 call-sign and have the advantage of still being able to attend some of the monthly ALARA luncheons and activities there and most of the bi-monthly lunches in VK3 (the only disadvantage is being frequently told by the OMs that they've "seen my photo in AR (*Amateur Radio* magazine) yet again"!

Both States are lucky to have active ladies groups. In VK5 recently, the core group of YLs was responsible for all the hard work associated with the 6 day YL International 2012 Conference. Each year in November they also serve food and drinks at the Adelaide Hills Amateur Radio Society's Buy and Sell/Hamfest, which is the main get-together for amateurs in Adelaide. The money raised by the YLs goes into ALARA funds and helps to subsidise some of the activities at the ALARAmeets which are held every three years.

The venues for the VK3 lunches vary between members QTHs and various hotels and restaurants. We enjoy welcoming our WARO friends at both the VK3 and VK5 lunches, so do let us know when you will be "on this side of the ditch"! Like the VK5 girls, the VK3 girls also get involved with catering at Hamfests, and other club activities. We also "person" ALARA information tables at various Hamfests, as does Dot VK2DB in NSW.

We have been lucky in obtaining new members, young and old, through the Foundation Licence, and many "F" calls have up-graded to Standard and some later have become Advanced licencees. Naturally we tend not to see as much of the younger ones, as they are often tied up with study or work. Some of the older "F" calls contribute greatly to the hobby, such as Margaret VK3FMAB who is our ALARA Columnist for AR Magazine.

It was great to work some ZL YLs and OMs in the ALARA Contest recently.

33 *Jenny VK3WQ/VK5ANW*

32nd ALARA Contest

Congratulations go to Catherine VK4GH who is once again the top scoring YL overall; Ngaire ZL2UJT for being the top scoring DX YL; Gerald VK2HBG the top scoring VK OM and Bill ZL3VZ the top scoring ZL OM. Great work all of you.

Next ALARA Meeting 2014

The next ALARA meeting will be held in Port Stephens, Nelson Bay, NSW, Australia. Dates are from: Friday 24th until Monday 27th of. October 2014. Contact person: Anjes Tobbe VK2GWI. Email Address: <anjes@tobbe.net.au> or website <http://alarameet.com> for further information.

If you are interested please contact Anjes and she will give you further information.

So ladies if you are interested in getting group together to go now is the time to start thinking about it.

Taranaki visit by Celia ZL1ALK

On a cold wet Taranaki afternoon on October 8 we held an afternoon tea at a local garden café for some of our Taranaki Ladies and husbands to catch up with Celia ZL1ALK who was visiting Taranaki for the weekend,. Quite a few couldn't make this venue due to other commitments.

A lovely group turned up and Celia was able to catch up with old friends from the past. We chatted about contests, field days and families. More and more of our group are drifting away from radio which is sad, but many are widows and are finding it difficult to ask other radio hams to help repair aerials etc. We are hoping to do our coffee get together a couple of times a year and will let others know if you want to be here and join us.

Ngaire ZL2UJT

WARO Achievement award
(Myrtle Earland Rosebowl)

Calling for nominations for 2013. If you know of someone YL who has made a special effort for WARO please contact Lynnette McDonald ZL1LL <lynnette.mcdonald@xtra.co.nz>

Get together at Pirongia

Biny & Mervyn Owen invite you to their home at 550 Kane St, Pirongia,

Branch 29 North Shore. Marian ZL1BLI (l) and Rosemary ZL1RO (r).

Rally of New Zealand – 2012 : Biny Owen ZL2ZY.

Waiau Trip "Lodge-to-Lodge" Half-Marathon. Our operating area with Bev ZL3OV at the radio.

Taranaki Ladies group 2012. Front to back left: Carolyn Sarten ZL2JP, Marie MulHullond ZL2WMM, Ngaire Jury ZL2UJT, Anne Griffiths ZL2BOV. Right side: Celia ZL1ALK, Graeme Jury ZL2APV, Dennis Sarten ZL2ME.

Phone 07 8719992 on Sunday 27th January 2013. Please bring a plate for lunch, Everyone welcome, Plenty of parking. Call on air 2 metres 7525 simplex. Very informal, come anytime from 11am onwards.

Rally of New Zealand – 2012

Biny Owen ZL2AZY

There is always a sponsor for these Rallies and this time round it was Brother (printers). So everyone was happy.

21-24 June 2012. It was good to be involved in the Rally again. It only comes around every 2 years now and the time of the year seems to constantly change. Anyway June was challenging. Support crews were asking what the weather and road surface were like so that they could sort out suitable tyres on their vehicles.

The OM and I, along with a good ex-Rally friend who supplied the vehicle, found ourselves on Friday 21st June at Te Akau South Special Stage 3 and 7. The 2 stages mean that Rally cars come by us twice both in the morning and afternoon.

Te Akau South is out in the wop-wops, nearly 2 hours drive away. Well beyond Raglan and Te Akau itself. This time we were parked inside a farmer's fence, in the mud and in a location that gave little time to see vehicles flash by. So it was a challenge. On this occasion the farmer was a radio enthusiast, with a huge workshop and some radio gear. Not only that he was engaged in hunting down a wild boar with one of his sons which they shot for a competition being held the next day in Hamilton. As an aside;it is always handy when you are within walking distance of a farm house as they invariably have an outside toilet. So that need was satisfied!

6.15.am - 5.30.pm. Activity for us started when leaving home with a call to Headquarters (Com Centre) to say we are on our way. Not to panic. Scheduled time of arrival at our allotted spot was 8.15.am. We have to be there prior to the road being closed and well ahead of the first scheduled Rally Car at 10.24. am. Large yellow sign to be placed 100 m up the road, a 'blue' one on site. Aerials to be erected and then a check call made to HQ. It all takes time. After which we can enjoy a cup of coffee and breakfast and wait.

2m contact. Great to have this running as well just to keep us up to date about what is happening. When Adrienne calls out that the 'Stage is Green' , we time how long it takes for the first Rally Car to get to us as we are located middle of the Stage. Since the first 10 cars are the fast boys, internationally, with only 1 minute gap between them, you can imagine how fast they are flying by. Fortunately we do have a sheet dropped off to us beforehand that gives us the order of the cars coming through. We just have to make sure that they are in order, or if not, transmit information on changes. Sometimes the number expected never arrives, which calls for an interesting analysis. But we have to stay firm and keep our fingers crossed that we have not made a mistake and that our situation is confirmed by the next Safety Point. The car did not arrive!

ZL2AZY – is converted to ZK1EDO for the Rally. Since my name was on the Coms list, it was I who did all the transmitting. I quite enjoy this. But it can mean anything up to a 2 hr stint depending on the number of Rally Cars. However, by the second time round in the afternoon, the numbers have invariably dropped off. Some vehicles that did not make it in the first round, we watch being towed out either on the back of a truck, or roped in convoy from a pick-up!

There are some hours to pass between these stages. Our lunch box and thermos now come in handy. Even our reading books. Blenndyn chooses to go for a walk but informs one and all when he comes back that he found the OM and I asleep; 40-winks we say.

Special Stage 7. Starts at 3.20 pm. So it is at least 5.00 pm before we are finished, then there is packing up to do. Home by 7 pm. Not feeling like cooking a dinner, so it is soup and toast. I always feel good when I have finished the day. No stuff-ups and YL capability confirmed for another year.

Biny Owen

A Weekend at Waiau

By Bev ZL3OV

Some months ago Don Laing ZL3DN, who, with his wife, Linda, are the owners of the Waiau Motor Camp, asked members of Br 68 for assistance in running Timing and Safety Communications for the "Lodge to Lodge" Half-Marathon and other associated races, at Labour Weekend. Don is one of only two radio hams in the area, the other not being available for this event.

Geoff ZL3QR and I offered to assist as with our interest in Awards, it would also provide an opportunity to put up some "Maidenhead Squares". Accommodation was assured and as a final piece of temptation, it was also to be Waiau's 150th Celebrations.

Friday 19th saw us arrive at Waiau in the late afternoon, having activated a few squares in the Culverden and Rotherham areas en route. Once checked into the Motor Camp, Don took Geoff down to the pub to meet some of the race officials and check where the comms base was to be set up, and it would be using the local 6975 (Mt Noble) Repeater. The main race (the Half Marathon) was to start at 9.30 am next morning, from the Mt. Lyford Lodge ski area, with a 21 km course to finish at the Waiau Lodge Hotel, this to be followed at 10.30 by a 10 km run/walk from the Wandle River Bridge, all on the Kaikoura Inland Road.

Saturday dawned bright and clear but with a very white and sharp frost. As Don was to comment later, "we ordered the good weather, but not the frost". At 8.30 we set up the radio base in front of the pub, right next to the timing crew, the object being that the timekeepers could hear the countdown for each start so to be able to set their stopwatches. This worked brilliantly and we received heaps of praise as in previous years, apparently, the use of a commercial radio system had not proven reliable.

Having set up base, Don then went up to the Lyford start then in due course, to the Wandle start afterwards acting as Tail End Charlie for that race.

As part of the 150th Celebrations, there were many stalls set up on the village green, with some people also in period costumes, and in the afternoon came the Grand Parade, led by Don in his vintage 1928 Ford Model A.

Saturday evening saw us join with Don and Linda and friends for dinner at the Hotel. Because of the large number of people enjoying the celebratory weekend, the pub was extremely popular causing some delays in the meals, to a point where Geoff and I were getting concerned that we would not be free in time for the 9.00 pm Awards Net that we had arranged to put up some "rare squares" for. Fortunately, we just made it in time.

With no great urgency attached to Sunday, we were able to enjoy a leisurely lay-in. The weather on the Saturday could not have been more perfect, but it became extremely windy for our drive home on Sunday. All in all, a most enjoyable weekend away, and we are now looking forward to Labour weekend next year.

Bev ZL3OV

Call Book

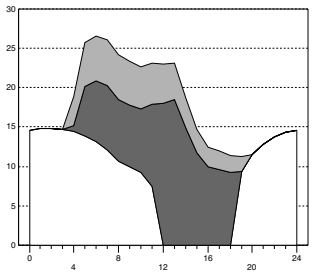
If you know of anyone who over the past few years has become a silent key, please fill in the form in *Call Book* on page 2-1 with the details.

Our Best Wishes & Merry Christmas.

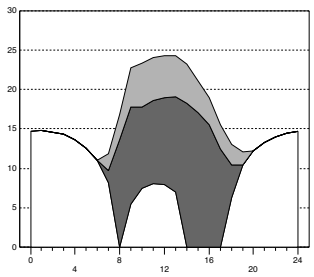
Topsy ZL2LS & Ngaire ZL2UJT

Ionospheric Predictions

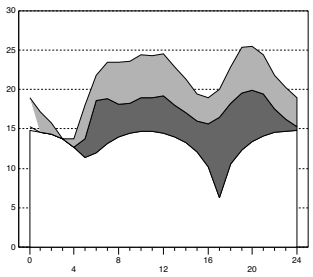
JANUARY / FEBRUARY 2013 **T-index = 86**



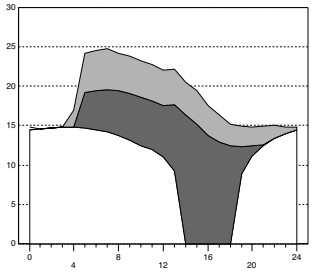
WN-
Moscow
(SP)
16548 km
312°



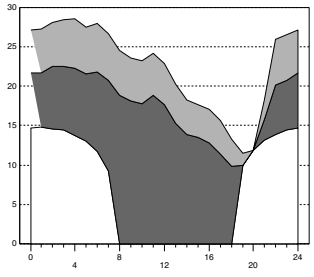
WN-
London
(SP)
18814 km
343°



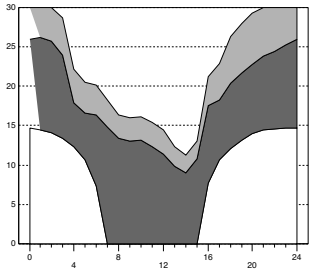
WN-
Jo'burg
(LP)
28265 km
31°



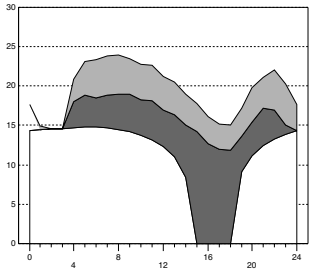
WN-
Istanbul
(SP)
17168 km
281°



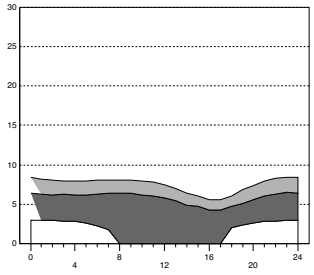
WN-
Tokyo
9274 km
332°



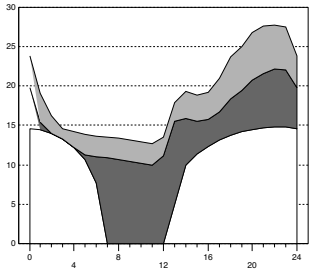
WN-
San
Francisco
10859 km
45°



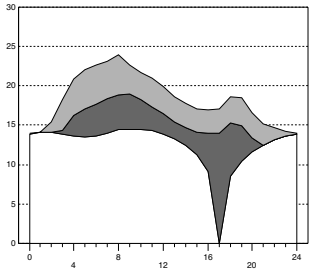
WN-
Cairo
16519 km
261°



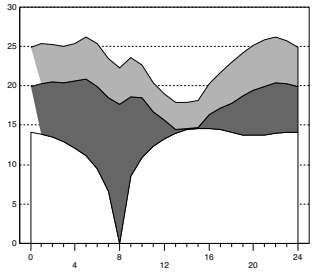
WN-
New
Zealand
300 km



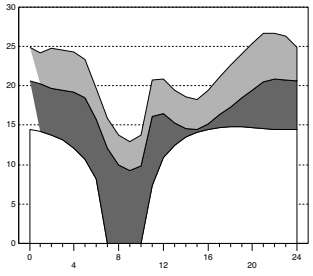
WN-
New
York
14402 km
66°



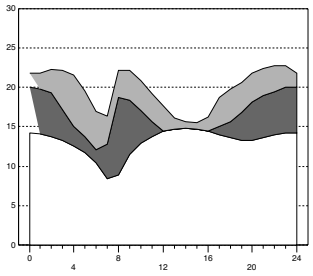
WN-
Jo'burg
(SP)
11759 km
211°



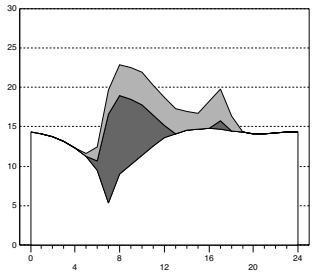
WN-
Rio de
Janeiro
11780 km
144°



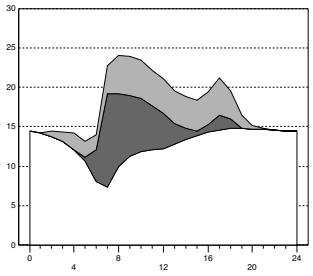
WN-
Barbados
13962 km
104°



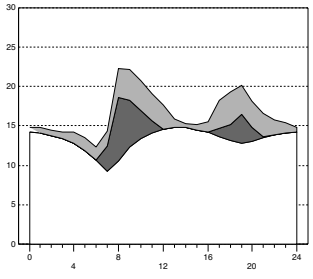
WN-
Dakar
16862 km
155°



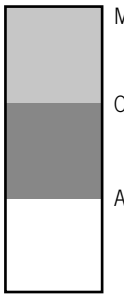
WN-
Moscow
(LP)
23476 km
132°



WN-
Istanbul
(LP)
22856 km
101°



WN-
London
(LP)
21210 km
163°



Horizontal axis shows time in UTC.

Vertical axis shows frequency.

Propagation is possible in the shaded areas, with best operation in the darker area.

These predictions are based on solar activity data supplied by IPS Radio and Space Services.

See pages 6–9, Break-In May/June 2004 "Choosing the Best Frequency" by the late John Gabites ZL2AQ for interpretation of forecasts and explanation of terms MUF, OWF and ALF.

Annual Index for 2012 *Break-In*, Volume 85

Title	*Issue*	*Page*
Technical; constructional		
30m QRSS beacon transmitter	Sept/Oct	11
A double sideband demodulator; the Mk3 squaring loop.	Jan/Feb	4
An electret microphone for a ZC1	May/June	24
Errata; A double sideband demodulator; the Mk3 squaring loop circuit diagram.	Mar/Apr	12
Fan dipoles for HF Applications	Jan/Feb	6
Hacking the VK5SJT antenna analyser	Nov/Dec	14
JBOT; an SSB linear made from just a bunch of transistors	Sept/Oct	7
Kiwi spotter	Mar/Apr	9
Using computer headsets for your transceiver	Sept/Oct	6
Working with coaxial transmission lines and connectors; Part 1.	Mar/Apr	5
Working with coaxial transmission lines and connectors; Part 2.	May/June	6
Technical general		
Amateur digital television transmissions	Nov/Dec	4
QRP Communications	May/June	14
SWR myths and mysteries	Nov/Dec	9
The LogiTALKER voice keyer	July/Aug	
Two way mobile tests via high voltage transmission lines	Nov/Dec	12
Working the big satellite	Sept/Oct	12
Antennas and propagation		
A 6 metre Moxon portable antenna	July/Aug	10
Down to basics with antennas, Pt 1	May/June	4
Down to basics with antennas; Pt 2	July/Aug	7
Fan dipoles for HF Applications	Jan/Feb	6
Hacking the VK5SJT antenna analyser	Nov/Dec	14
Physics; and the reality of amateur radio antennas	July/Aug	27
QRP Communications	May/June	14
SWR myths and mysteries	Nov/Dec	9
The folded dipole and its derivatives; Pt 1	July/Aug	4
The folded dipole and its derivatives; Pt 2	Sept/Oct	4
Transmitting antennas for 500 kHz; Pt 1	Nov/Dec	6
Two way mobile tests via high voltage transmission lines	Nov/Dec	12
What do they do with those big dishes? What is radio astronomy	Sept/Oct	8
Working the big satellite	Sept/Oct	12
Book & Software reviews		
Book review; *"Test Equipment for the Radio Amateur, 4th edn"*	Sept/Oct	29
Book review; *"Valves Revisited"*	July/Aug	27
General interest		
"The ballad of the Ham'	July/Aug	18
Amateur radio memoirs	Nov/Dec	16
Amateur Radio Westfest 2012	Sept/Oct	16
Arrival of TV in Hastings and Napier	Mar/Apr	34
Every kid in the country will have one ! Training and testing issues	Mar/Apr	8
Ham on Ice; the fulfilment of an engineer's dream	Jan/Feb	12
How to buy a paddle key	May/June	9
Jamboree on the Air	Sept/Oct	9
Musick Memorial Station; Branch 86's clubrooms.	May/June	10
My first radio build/construction/kit assembly	July/Aug	4
The basics of "Ham Speak"; a tutorial	July/Aug	24
Tony's maritime net	Nov/Dec	18
World Radio Conference 2012	May/June	15
ZL Crossword No.15 (answers p 32)	Jan/Feb	23
ZL Crossword No.16 (answers p40)	May/June	27
ZL Crossword No.17 (answers on p38)	July/Aug	38
ZL Crossword No.18 (answers p40)	Sept/Oct	27
ZL Crossword 19 (answers p37)	Nov/Dec	22
NZART		
Call for nominations; NZART President and Council	Nov/Dec	13
Notice of Elections; President & Council	Sept/Oct	3
NZART Conference 2012 Nelson	July/Aug	22
NZART Conference 2012 update	Jan/Feb	3
NZART Conference 2012; AGM & reports.	March/April	13
NZART Conference 2012; AGM.minutes	July/Aug	19
NZART VHF-SHF Records; rules and guideline changes.	March/April	26
The basics of "Ham Speak"; a tutorial	July/Aug	24

Past issues of *Break-In*

Indexes for past volumes of *Break-In* from 1947 to the present are available on the NZART web site; <http://www.nzart.org.nz/nzart/nzart/Breakin/index/bi-index.htm>

NZART Conference 2013
Branch 46 Wairarapa Amateur Radio Club
Masterton – Home of the Golden Shears
Queen's Birthday weekend
31 May – 2 June 2013

Venue: Copthorne Hotel and Resort Solway Park Wairarapa, High Street, Masterton.
Accommodation: Copthorne Hotel and Resort Solway Park Wairarapa
On the outskirts of Masterton, Wairarapa's largest town, the Copthorne Hotel and Resort Solway Park is set in 24 acres of landscaped parklands with its own native bush walks and fragrant gardens. The hotel and resort provide 102 bedrooms, leisure and business facilities including three restaurants and bars, gym, swimming and spa pools, tennis and squash courts, seven conference rooms, business centre and golf driving range on site. The hotel holds a Qualmark 4 Star Plus and Enviro-Gold rating.

Ring Copthorne Hotel on 0800 765 929 or email <reservations@solway.co.nz> and quote the group booking reference number **67866** for a flat rate for any room (standard and luxury)of $145 per night. There is also free parking available for campervans (non powered site) at the location.
There are also plenty of other hotels and motels no more than 10 minutes driving time from the venue to suit your budget.
Forums: If you are interested in running a forum or would like to see a particular subject for a forum, please don't hesitate to contact the organising committee.

Please contact the committee for further information or suggestions at <info@nzartconference2013.co.nz> or visit the conference web site <nzartconference2013.co.nz> or Postal address of Branch 46 NZART Conference 2013, PO Box 860, Masterton.

See you there.

HAMADS

WANTED: RADIO VALVES. Cash paid for old radio and TV valves. Prefer new in boxes. Telephone (09) 528-2022 or E-mail <paul.ssegrub01@gmail.com>

WANTED: Kenwood SM-220 Station Monitor in good order. ZL1BAD. Telephone (09) 232-8775 or E-mail <bobknowles@xnet.co.nz>

WANTED: HF Transceiver complete with mic etc in going order. Price and particulars to ZL3GT at *Call Book* Address.

WANTED: Older type crystals for 80 metre CW and 160 metre CW. Ivan ZL2ATU. Telephone (06) 343-6979 or *Call Book* Address.

WANTED: Schematic or complete service manual for elderly SSB transceiver SGC SC711E/NZ, manufactured by Radio Engineering, Dunedin. ZL1BPU. E-mail <ZL1BPU@nzart.org.nz>

WANTED: FT-790RII All Mode 70cm transceiver going or not with the clipon 25W linear amplifier (FL-7025) or just the amplifier. Kevin ZL3DAC. Telephone (03) 789-9875.

WANTED: Valves wanted to purchase, fair price paid, all types but esp following types – ECC32 ECC33 ECC34 ECC35 B65 6SN7 6SL7 ECC81 ECC82 ECC83 ECC803S ECC88 E88CC E188CC 7308 EF86 KT61 KT66 KT88 EL34 EL37 PX4 PX25 GZ32 GZ33 GZ34 GZ37 CV378 CV575 VT52 45 50 211 801 805 845. Also looking for an AVO or Weston Valve Tester and a good quality capacitor tester. Geoff Edwards, Valve Radio Spares, 12 Oxford St., Lyttelton 8082. Telephone (03) 328-9208 or (027) 433-8452 or Fax (03) 328-9207 or E-mail <tubehead@xtra.co.nz>

WANTED to SWAP: IC-R5100 Communications Receiver just over a year old for a good working order portable all-band radio AC-DC up to 8 to 10 years old. Owner chose not to know how to use it – too high tech! IC-R5100 cost $864 so expect a good dollar value swap. Please contact Des Davey, 16 View Road, Te Kuiti 3910 or Telephone (07) 878-7315.

FOR SALE: Yaesu Communications Receiver FRG 8800 with FRT 7700 Tuner in mint condition, has had little use. $375 for both. Ivan ZL2ATU. Telephone (06) 343-6979 or *Call Book* Address.

FOR SALE: Yaesu FT 757 GXII, FP 707 20A Power Supply, MFJ 949C Antenna Tuner, Shure 444D desk microphone. All in good working condition. What offers? John ZL2CAT. Telephone (04) 904-2659.

FOR SALE: Yaesu FRDX400, FLDX400, FC901, FT207R, FT224, FP2, Hustler 4BTV Trap Vertical, 2 m antenna and various accessories. No reasonable offers refused. ZL1BAW. E-mail <eric.coleman@xtra.co.nz>

FOR SALE
Perfect Amateur Radio Property

Impeccable 5 acre property at Dairy Flat, 20 minutes drive North from downtown Auckland. Two cottages, caretaker at entrance, owner's cottage on hilltop.

New 50 ft Nally tilt-over, crank-up tower set in massive foundation. Currently using hex-beam but tower and rotator can take any combination of beams. New Kenwood TS-480HX (200 W), excellent DX. ADSL internet installed allowing remote operation. Property, buildings and fencing in pristine condition. Large new 3 door barn for workshop, garage etc. Farmhouse has new roof and insulation. Established orchard and flower beds, creek. Caretaker permanently maintains property, absolutely nothing to repair. New Pakn'Save at Silverdale 2 minutes drive, Orewa beach 10 minutes away, 1.5 km from North Motorway. No noise, beautiful views. 3 large paddocks all newly fenced.

Regrettably selling because of prolonged cancer treatment in Australia. Asking property cost at $975000.

John Nixon ZL1FR/VK4BJN <john.nixon.ambsdr@gmail.com>

Hamads and Classified Advertising in *Break-In*

Hamads up to 30 words are now free as a service to members but the following conditions will apply:

(1) Hamads. A single, free Hamad in each issue of *Break-In* is only available to financial members and Branches of NZART buying or selling personal equipment. Members and Branches wishing to use this service must include their NZART Membership Number or other evidence of membership. If possible they should use the official HAMAD form (on the reverse of their address sheet). If this is not convenient the advert may be emailed or sent typed double-spaced, but proof of current membership must be provided.

Each free Hamad is limited to 30 words; any extra words will be charged at the current rate of 25c per word, telephone and fax numbers count as two words each, e-mail addresses and *Call Book* address as three words each. All prices include GST. Free Hamads will also be accepted for sales of deceased estates where the member was a financial member of NZART during the past 12 months and from branches who are financial members of NZART (ie have a Membership No).

Advertisements are accepted in good faith from amateurs and may only be used be the sale of used radio and allied equipment. The Association, or its representatives, can take no responsibility for them nor take part in any discussion resulting from sales or purchases; remember "Caveat emptor". In case of dispute, the Editor's decision is final.

Trade or business adverts, even from members, will not be accepted here, since this is a subsidised service to members.

(2) Classified Advertisements are available to members, non-members and commercial firms offering products or services for sale, etc. All adverts not meeting the Hamad criteria will be considered to be Classified Advertisements.

Classified Advertisements will be charged at 40c per word. Bold type is available at 50c per word. For semi-display (ie rule above and below) add $5.00. All Classified Advertisements must be pre-paid, receipts will not be given. All prices include GST.

(3) Display style adverts will be still be charged for at the current rates.

(4) Closing date. Please send Hamads and Classified Advertisements to The Advertising Manager, PO Box 1733, Christchurch, to be received no later than the 10th of the month prior to publication. Please make cheques payable to NZART; no cash or credit cards. The Editor and NZART Inc reserve the right to discontinue or decline any advertisement.

For further information and commercial advertising rates, please contact:
Lorne Douglas ZL2AHB, Advertising Manager, c/- PO Box 1733, Christchurch. Telephone (03) 358-9100. E-mail: <hamads@nzart.org.nz>.

Answers from page 5:

Answer to *Break-In* Archives – Q3: ZL1HF

Answer to *Break-In* Archives – Q4: Eleven

Nelson Branch 29 Buildathon

Brightwater Scouts FM Radio Buildathon.

Pete ZL2FSK and Sam.

Tane with Topsy ZL2LS and Steve ZL2ASC.

International Rally of New Zealand 2012

Results room with WRC automated results system.

5 km safety tracking with Adrienne and Kelly.

Doug receiving results.

David ZL1DK and Doug ZL1TTE receiving results.

ICOM

Experience Icom technology in analogue & digital

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IC-R6

IC-9100

IC-80AD

IC-92AD

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